POPULAR SCIENCE MONTHLY

JUNE 1947
25 CENTS

RAY-O-VAC

LEAK PROOFS

sealed against corrosion... sealed against power loss!

Ray-O-Vac LEAK PROOFS keep your flashlight *safe* from corrosion—they're insulated and sealed-in-steel to keep corrosive battery materials from damaging your flashlight. This same patented construction prevents loss of battery energy. LEAK PROOFS *stay fresh* 'til you need them! For FREE helpful "Flashlight Service Guide" write Dept. PS-3, Ray-O-Vac Co., Madison 3, Wis.

Read this Guarantee

AGAINST FLASHLIGHT DAMAGE

If your flashlight is damaged by corrosion, leakage, or swelling of this battery, send it to us with the batteries and we will give you FREE a new comparable flashlight with batteries.

ONLY LEAK PROOFS HAVE THE "ADDED FOUR" THAT'S WORTH MORE

START WITH A POWERFUL BATTERY

ADD STEEL BOTTOM

ADD STEEL TOP

ADD INSULATION

ADD STEEL JACKET

FINISH WITH RAY-O-VAC LEAK PROOF

BUY SPARES... THEY STAY FRESH!

Copyrighted material

MEN WANTED FOR PERMANENT JOBS WITH ICS

HERE'S AN UNUSUAL OPPORTUNITY FOR THOSE WITH UNUSUAL ABILITY

If you are the type of man we are looking for, you probably have a good job already . . . you enjoy your work . . . you are well known and respected among your fellow workers . . . you feel that any change should bring you not only more money, but a better chance to be of service to more people.

It is with men like this that the International Correspondence Schools will fill out its nation-wide staff of Field Representatives during the next few months.

The men we select will be given responsible, rewarding positions in sales and service work covering their own and nearby communities. Their earnings will be high. As capable Field Representatives, they may earn as high as $7,500 per year. They will schedule their own working hours, plan their own sales programs, advance as rapidly as their initiative and ability permit.

Applicants should be 22 to 45 years of age, have a good education, a friendly personality, ambition to succeed, and should be able to pass a rigid character investigation. Sales experience, though helpful, is not essential. The men chosen will be expected to spend evenings for a few weeks studying special training courses. They will receive a regular salary during this period. Further training will be given on the job under the supervision of an experienced Field Officer.

If you are seriously interested in a satisfying future with I. C. S., we suggest that you mail this preliminary application immediately. Personal interviews for men showing the greatest promise will be arranged by I. C. S. Field Officers in your area. All applications will be confidential.

INTERNATIONAL CORRESPONDENCE SCHOOLS
Box 7684-L, Scranton 9, Pa.

Name _____ *Age* ____

Address _____

Present Occupation _____

EDUCATION:

High School *(circle years completed)* 1 2 3 4

College *(circle years completed)* 1 2 3 4 5 6

Correspondence Schools *(list courses completed)*

_____

_____

Copyrighted material

FOUNDED 1872 VOL. 150: NO. 6

POPULAR SCIENCE

Mechanics & Handicraft MONTHLY

REG. U. S. PAT. OFF.

EDITOR:
Perry Githens

MANAGING EDITORS: Fred O. Newman, Volta Torrey

ART EDITOR: Howard C. Jensen

HOME & WORKSHOP EDITOR:
Harry Walton

ASSOCIATE EDITORS: Devon Francis, Robert Gorman, Hartley E. Howe, Herbert Johansen, Martin Mann, Frank Rowsome, Jr., John F. Stearns, R. P. Stevenson

WASHINGTON EDITOR: Leon Shloss

WESTERN EDITOR: Andrew R. Boone (Los Angeles, Cal.)

ART DIRECTORS: Harry Samuels, Francis Sweeney

ART ASSOCIATES: Eric Karminski, Jr., Stewart Rouse, Frances Cooper (Production)

STAFF PHOTOGRAPHERS: W. W. Morris, Hubert Luckett, Robert F. Smith

EDITORIAL ASSISTANTS: Mae G. Dyer (Chief), Carol Ennis, Sheldon Gallager, Saverio Rada, Lillian Thalenfeld, Ruth Westphal

PUBLISHER:
Godfrey Hammond

JUNE 1947

SCIENCE NEWS

The War Against Hail..... 82
Minerless Mine Preburns Coal..... 90
Radar Clocks the Traffic..... 98
Spearhead of Research.....100
Tracers Trailed.....101
Gateway to the Universe.....136

SCIENCE AT WORK

Picture of the Month..... 81
Two-way Heat Tested in Railroad Car 95
Looking into Steel.....101
Lightweight Plastic Arm.....122
Color Punches the Time Clock.....124
New Paints from Oil.....129
Logs Walkers' Course.....131
Hurricanes Harnessed in a Hangar.....134
"Biggest Inch" Goes West.....142

PSM FEATURES

Giant Plow "Plants" Telephone Cable.... 95
Winning the War on Uniforms.....106
Typewriter Catches Mistakes.....112
From Egg to Toad.....116
Sculping a Television Lincoln.....119
Movie Cartoon Shows Welding Benefits 120
Mine-killing Snake.....131
French Weave Houses.....141
This Is Where Your Money Goes.....146

AVIATION

One for the Books..... 89
The "Ghost" Goes to Work..... 96
Navy's Fastest Fighter.....102
Motor Merry-go-round.....103
Periscope Avigation.....104
Bump Speeds Air Flow.....105
Skystreak (Pin-up).....113
Air Liners Shed Rivets.....122
Steam Runs Jet.....127
Superspeed Needs Supermen.....137
6-in-1 Wind Tunnel.....145

AUTOMOBILES

Prowl Car Packs Bed..... 92
Trends in Trailers.....141
Auto Hints.....154
Gus Short-cuts a Long Job.....155
British Cars—Mechanical Marvels.....158

INVENTIONS

Electric Drum Timer..... 92
New Ideas from the Inventors.....114
I'd Like to See Them Make.....118
Safety Rides a Scaffold.....123

PHOTOGRAPHY

Print Your Photos Anywhere.....194
Developing in the Light.....197

(CONTINUED ON PAGE 4)

Published monthly at 353 Fourth Avenue, New York 10, N. Y., by Popular Science Publishing Co., Inc. Godfrey Hammond, President and Treasurer; R. C. Wilson, Raymond J. Brown, Stephen P. Glennon, B. Ray Keefer, Vice-Presidents; F. W. Briggs, Secretary. Entered as second-class matter Dec. 28, 1918, at the Post Office at New York under the act of March 3, 1879; additional entry as second-class matter at Dayton, Ohio. Entered as second-class matter at the Post Office Department, Canada. Printed in U. S. A.
Copyright, 1947, by Popular Science Publishing Co., Inc. All rights reserved in the United States, Great Britain, and in all countries participating in the International Copyright Convention and Pan-American Copyright Convention.
Yearly subscriptions to United States, its possessions and Canada, $2.50; foreign countries, $3.50. Subscribers must notify us of change of address four weeks in advance of the next publication date. Be sure to give both old and new addresses, including zone numbers.

Copyrighted material

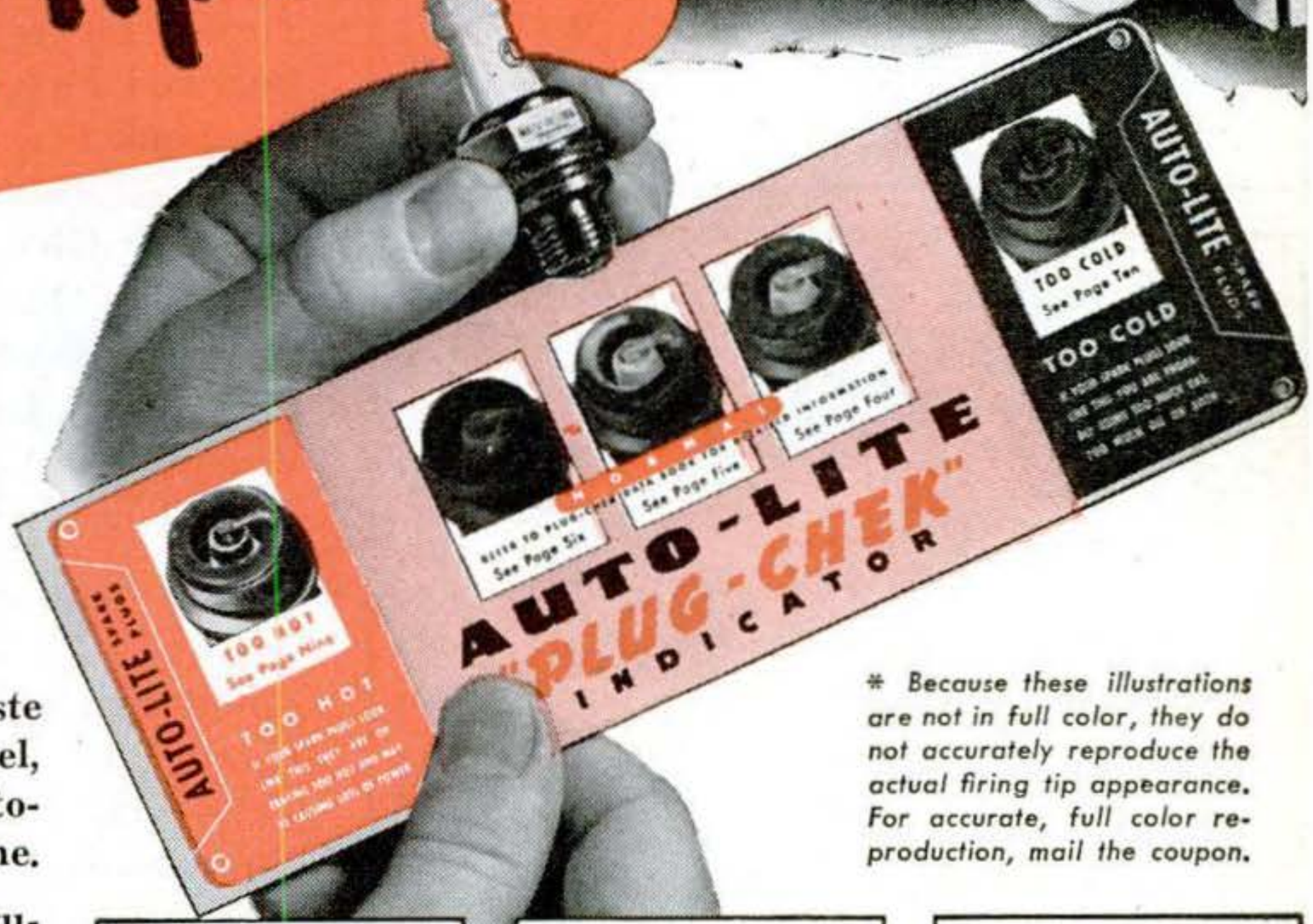
AUTO-LITE "Plug Tips"

AVOID WASTE, Check Spark Plugs Regularly

The right type of spark plug will save you time and money. Plugs which are faulty and mis-fire waste as high as 10 per cent of your fuel, according to experts. And hard-to-start engines can lose valuable time.

Check all your spark plugs regularly to make sure you have the right plugs for your engines.

This Auto-Lite "Plug-Chek" Kit quickly helps you find spark plugs that are causing trouble. All you do is match plugs with pictures on the "Plug-Chek" Indicator—each example refers to a page in the "Plug-Chek" Data Book that shows you what to do.



** Because these illustrations are not in full color, they do not accurately reproduce the actual firing tip appearance. For accurate, full color reproduction, mail the coupon.*

Too Hot*
If spark plug firing tips are fused or blistered, plugs are operating too hot and may be causing loss of power.

Normal*
If spark plugs look like this, they are of correct heat range. Get your Auto-Lite "Plug-Chek" Kit right now.

Too Cold*
If spark plug firing tips show deposits of carbon or are wet with oil, plugs are too cold, may waste dollars in costly gas.

Send for your Auto-Lite "Plug-Chek" kit...only 10¢!

Switch to AUTO-LITE SPARK PLUGS

THE ELECTRIC AUTO-LITE COMPANY
Department PS3, Toledo 1, Ohio
Enclosed find ten cents for the Auto-Lite "Plug-Chek" Kit that includes both the "Plug-Chek" Incicator and Data Book.

Name_____

Address_____

City_____

Copyrighted material

MECHANICS & SHOPCRAFT

Electric Outboard Stalks Fish.....185
New Shop Ideas.....188
Vertical Steam Engine (Part III).....190
Concrete Proportions.....199
Dams Turn Water into Kilowatts.....200
Vacuum Cleaner as Power Tool.....212
Steam-bending as Experts Do It.....216

HOME MECHANICS & HANDICRAFT

Craftwork Projects of the Month.....128
Dipping Plastic into the Rainbow.....132
Shutters Add Personality to House.....164
Turned Lamp Is Oil Finished.....169
Jigsawed Pieces Build Animals.....178
Car-trunk Boat Carries Two.....180
Veneered Table Uses Little Wood.....182
Chipping Gives Texture to Plastic.....198
Electrical Dish Drier.....210
Back-yard Boat Builders.....215
Buoy Marks Lost Gear.....222
Wire Screen Sweeps Chimney.....222
Sled Drag Marks Seed Rows.....223

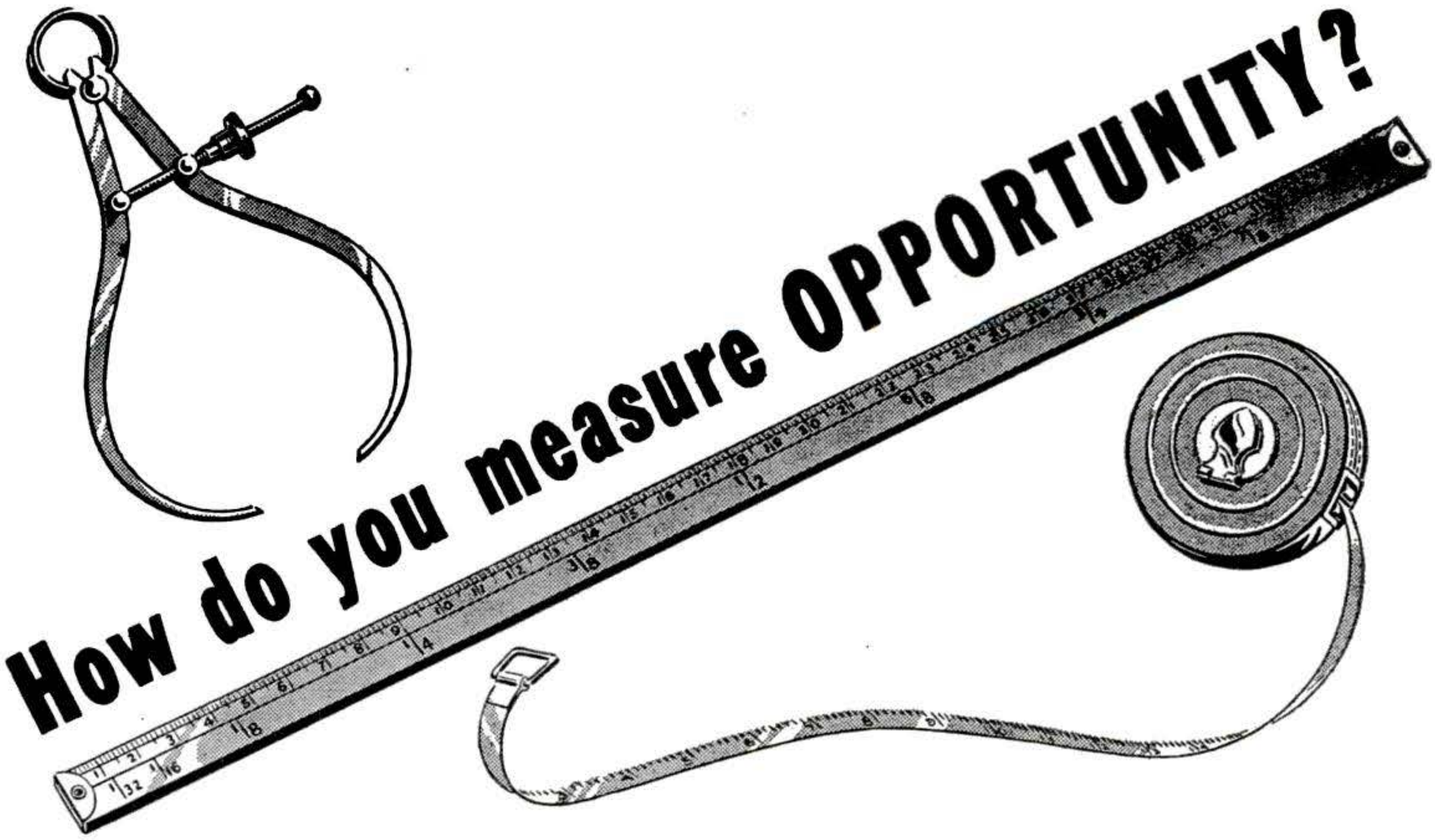
RADIO & ELECTRICITY

Counting a Million a Second..... 93
Photo Tube Is a Midget.....122
Tube with a Memory.....144
How Dutch Hid Radios.....144
Packaged Radio Power.....204
One-tube Radio Can Be Mailed.....208
News in Electronics.....209
File Makes Insulation Scraper.....210
Can Protects Outdoor Switch.....210

DEPARTMENTS

Voice of Science..... 7
Letters 16
March of Science.....100
What's New in Aviation.....102
Aids to Modern Living.....153
Craftsmen at Work.....173
Keeping the Home Shipshape.....174
What's Your Ingenuity Quotient?.....176
For Boats and Boating.....184
Photo Ideas and Equipment.....197
What's Wrong?.....199
New Tools.....211
Home Experiments.....220
For Easier Farming.....224
Editorial Memo.....270

Copyrighted material



YOU MIGHT use a mechanic's micrometer or a draftsman's dividers, a surveyor's tape or an engineer's rule, but only with *training* can you hope to get the fullest measure of *opportunity*.

For opportunity is elastic — it expands along with your knowledge and ability. And whether you will "measure up" to the responsibilities of a successful future depends upon whether you are taking special training to qualify you for better positions along the way.

You can start now on a program of Personal Advancement — through training. The world-famous International Correspondence Schools are ready to help you in the same way that they have helped thousands of today's leaders in American business and industry.

Now is the time to broaden your opportunities and prepare for a rewarding future by study with I. C. S. Start today by mailing this coupon for complete information.

INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

BOX 7685-L SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course *before* which I have marked X:

Air Conditioning and Plumbing Courses
- ☐ Air Conditioning
- ☐ Heating ☐ Plumbing
- ☐ Refrigeration ☐ Steam Fitting

Chemistry Courses
- ☐ Chemical Engineering
- ☐ Chemistry, Analytical
- ☐ Chemistry, Industrial
- ☐ Chemistry, Mfg. Iron & Steel
- ☐ Petroleum Refining ☐ Plastics
- ☐ Pulp and Paper Making

Civil Engineering, Architectural and Mining Courses
- ☐ Architectural Drafting
- ☐ Architecture
- ☐ Bridge and Building Foreman
- ☐ Building Estimating
- ☐ Civil Engineering
- ☐ Coal Mining
- ☐ Contracting and Building
- ☐ Highway Engineering
- ☐ Lumber Dealer
- ☐ Reading Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Drafting
- ☐ Structural Engineering
- ☐ Surveying and Mapping

Communications Courses
- ☐ Electronics
- ☐ Practical Telephony
- ☐ Radio, General
- ☐ Radio Operating
- ☐ Radio Servicing
- ☐ Telegraph Engineering

Electrical Courses
- ☐ Electrical Drafting
- ☐ Electrical Engineering
- ☐ Electric Light and Power
- ☐ Lighting Technician
- ☐ Practical Electrician

Internal Combustion Engines Courses
- ☐ Auto Technician ☐ Aviation
- ☐ Diesel-Electric
- ☐ Diesel Engines ☐ Gas Engines

Mechanical Courses
- ☐ Aeronautical Engineering
- ☐ Aircraft Drafting
- ☐ Flight Engineer
- ☐ Foundry Work
- ☐ Heat Treatment of Metals
- ☐ Industrial Engineering
- ☐ Industrial Metallurgy
- ☐ Machine Shop
- ☐ Mechanical Drafting
- ☐ Mechanical Engineering
- ☐ Mold-Loft Work
- ☐ Patternmaking—Wood, Metal
- ☐ Reading Shop Blueprints
- ☐ Sheet-Metal Drafting
- ☐ Sheet-Metal Worker
- ☐ Ship Drafting ☐ Ship Fitting
- ☐ Tool Designing
- ☐ Toolmaking
- ☐ Welding—Gas and Electric

Railroad Courses
- ☐ Air Brake ☐ Car Inspector
- ☐ Diesel Locomotive
- ☐ Locomotive Engineer
- ☐ Locomotive Fireman
- ☐ Railroad Section Foreman

Steam Engineering Courses
- ☐ Boilermaking
- ☐ Combustion Engineering
- ☐ Engine Running
- ☐ Marine Engineering
- ☐ Steam Electric ☐ Steam Engines

Textile Courses
- ☐ Cotton Manufacturing
- ☐ Rayon Weaving
- ☐ Textile Designing
- ☐ Woolen Manufacturing

Business and Academic Courses
- ☐ Accounting ☐ Advertising
- ☐ Arithmetic ☐ Bookkeeping
- ☐ Business Correspondence
- ☐ Business Management
- ☐ Certified Public Accounting
- ☐ Commercial
- ☐ Cost Accounting
- ☐ Federal Tax
- ☐ First Year College
- ☐ Foremanship ☐ French
- ☐ Good English ☐ High School
- ☐ Higher Mathematics
- ☐ Illustrating ☐ Motor Traffic
- ☐ Postal Service
- ☐ Salesmanship ☐ Secretarial
- ☐ Sign Lettering
- ☐ Spanish ☐ Stenography
- ☐ Traffic Management

*Name*_____ *Age*_____ *Home Address*_____

*City*_____ *State*_____ *Present Position*_____

*Working Hours*_____ *A.M. to*_____ *P.M.* **Length of Service in World War II**_____

Special tuition rates to members of the Armed Forces. Enrollment under the G.I. Bill of Rights approved for War II Veterans.
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

Copyrighted material

THE NEW EXIDE BATTERIES

Finest ever to bear the famous *EXIDE* name

In the New Exide Automotive Batteries are combined the results of ceaseless research and development by Exide engineers, plus wartime experience on automotive equipment of all kinds—serving in every climate under the severest conditions a storage battery ever had to endure. In every respect, these are the best Exide Batteries ever offered to the car owners of America.

NOTE THESE NEW FEATURES

- Extra-duty capacity—for greater power
- Heavy, over-size plates—for longer life
- Double insulation between plates
- Self-cleaning, non-spitting vent plugs
- "Bull's Eye" electrolyte leveling device
- Heavy, over-size inter-cell connectors.

If you would like to know more about storage batteries, write for FREE booklet, "THE STORAGE BATTERY, Its Fundamentals, Use and Maintenance."

WHEN IT'S AN EXIDE . . . YOU START

•

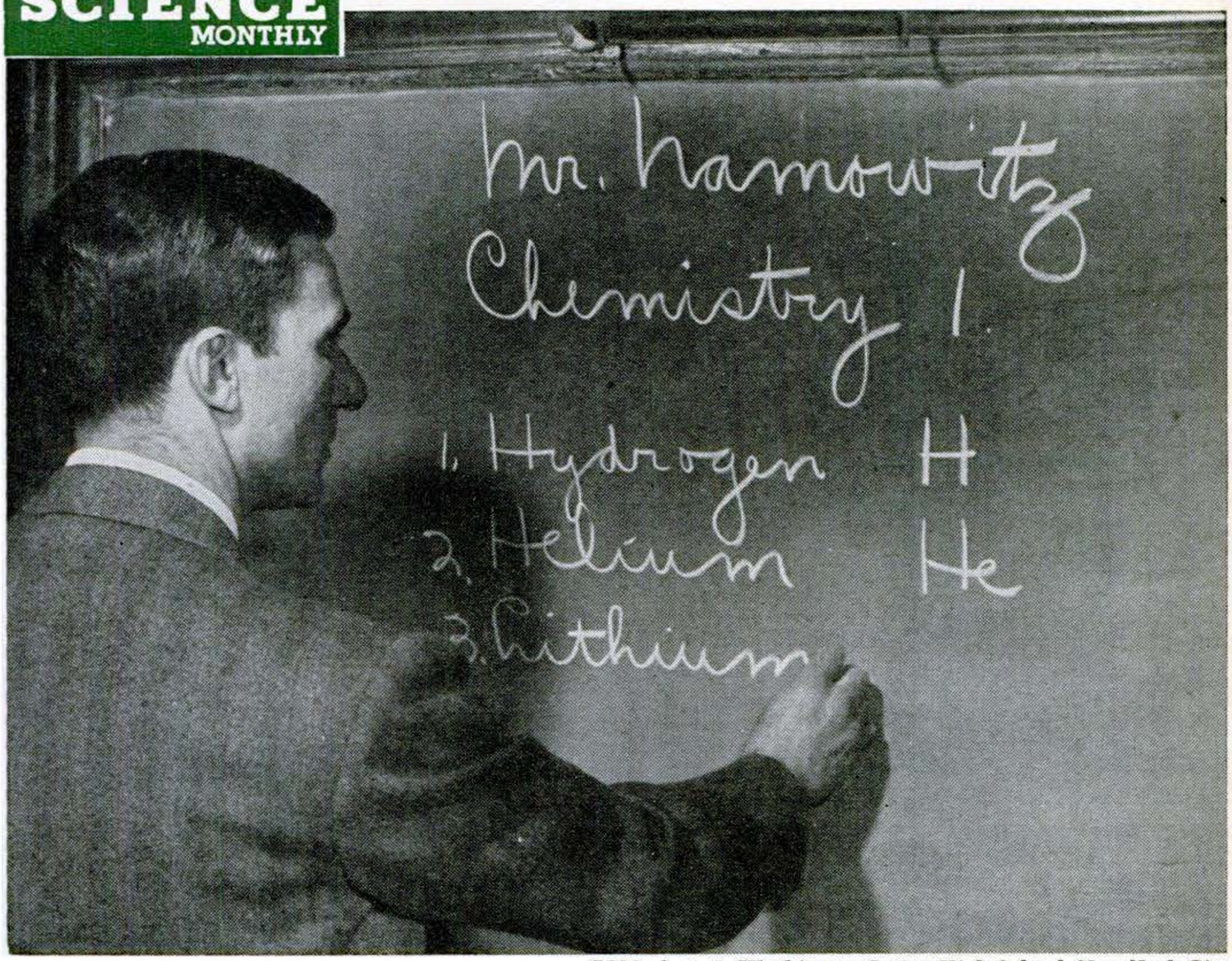
THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

Copyrighted material

POPULAR SCIENCE MONTHLY

VOICE OF SCIENCE



PSM photo in Washington Irving High School, New York City

Who Will Teach Tomorrow's Voters?

A GENERATION ago, H. G. Wells closed his monumental *Outline of History* with this head-shaking thought:

"Human history becomes more and more a race between education and catastrophe."

Today, with the bursting atom ominously linked with catastrophe, the race is running faster. Never before was education so vital. Science moves ever closer to the citizen. Yet, as the schools close this month, how many of the teachers are sure to be back in front of the blackboards in the fall?

The outlook is particularly dark for the science courses in the secondary schools. As Elbert C. Weaver, who heads its Committee on High School Chemistry told the American Chemical Society, "This year, 307 teaching certificates in science or mathematics are to be granted out of 120,000 undergraduates in 18 teachers' colleges."

Since the war began, almost half of the scant quarter-million teachers in secondary schools have left for decently paid jobs in industry. "Of the teachers now on the job," adds Mr. Weaver, "about 15 to 20 percent teach some science, and about one-third of these teach chemistry."

If this is hardly a healthy preparation for citizenship in the atomic age, you know whom to blame, don't you? Or weren't you present when the town meeting voted the new ball field, or the city council slipped through the costly war memorial?

Park, statues, swimming pools, and new civic buildings are good things. But if education is to win the race with chaos, perhaps we would do better to have more—and happier—teachers in front of our blackboards.

Perry Gitchell

Copyrighted material

To the man who wants to enjoy an ACCOUNTANT'S CAREER

IF you're that man, here's something that will interest you.

Not a magic formula—not a get-rich-quick scheme—but something more substantial, more practical.

Of course, you need something more than just the desire to be an accountant. You've got to pay the price—be willing to study earnestly, thoroughly.

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study—over a comparatively brief period in your life? Always provided that the rewards were good—a salary of $3,000 to $10,000?

An accountant's duties are interesting, varied and of real worth to his employers. He has *standing!*

Do you feel that such things aren't for you? Well, don't be too sure. Very possibly they *can* be!

Why not, like so many before you, investigate LaSalle's modern Problem Method of training for an accountancy position?

Just suppose you were permitted to work in a large accounting house under the personal supervision of an expert accountant. Suppose, with his aid, you studied accounting principles and solved problems day by day—easy ones at first—then the more difficult ones. If you could do this—and if you could turn to him for advice as the problems became complex—soon you'd master them all.

That's the training you follow in principle under the LaSalle Problem Method.

You cover accountancy from the basic Principles right up through Accountancy Systems and Income Tax Procedure. Then you add C. P. A. Training and prepare for the C. P. A. examinations.

As you go along, you absorb the principles of Auditing, Cost Accounting, Business Law, Statistical Control, Organization, Management and Finance.

Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

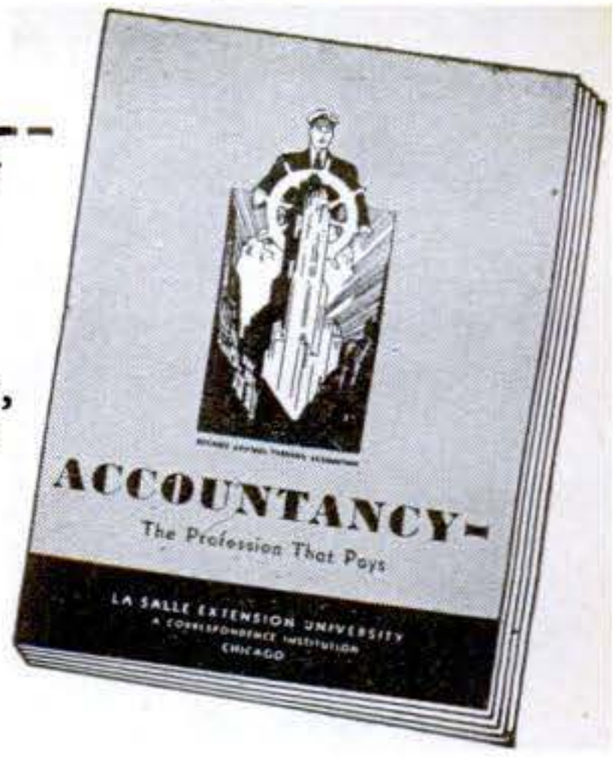
Will recognition come? The only answer, as you know, is that success *does* come to the man who is really *trained.* It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

Write For This Free Book

For your own good, don't put off investigation of ***all*** the facts. Write for our free 48-page book, "Accountancy, The Profession That Pays." It'll prove that accountancy offers brilliant futures to those who aren't afraid of serious home study. Send us the coupon *now.*

Over 2300 Certified Public Accountants among LaSalle alumni

G. I. APPROVED



LASALLE EXTENSION UNIVERSITY

A CORRESPONDENCE INSTITUTION

417 South Dearborn Street, Dept. 683-H Chicago 5, Illinois

I want to be an accountant. Send me, without cost or obligation, the 48-page book, "Accountancy, The Profession That Pays," and full information about your accountancy training program.

Name.....

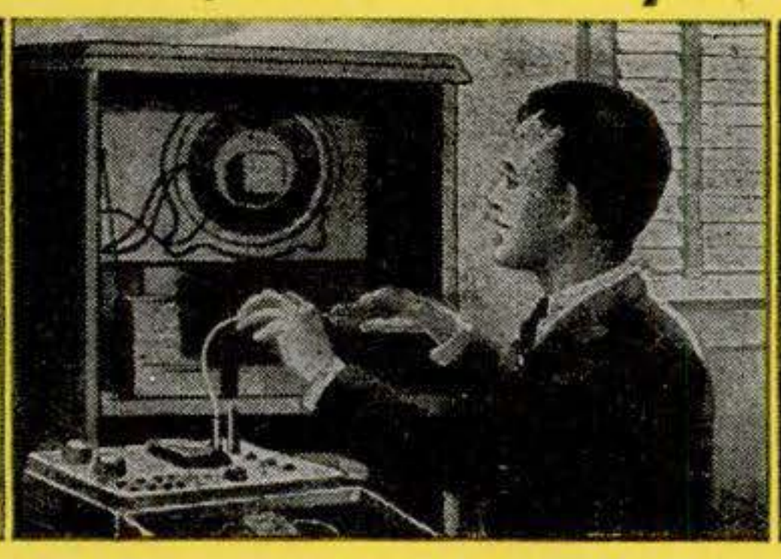
Address..... *City*.....

Position..... *Age*.....

Copyrighted material

LEARN RADIO BE YOUR OWN BOSS

HERE'S HOW to Start Your Own Radio Service Business *(Full Time or Spare Time)* Without Capital



1 You learn by building *real Radio Circuits* with big kits of parts I send you.

2 You soon make EXTRA MONEY fixing neighbors' Radios in spare time.

3 You use this extra money to START YOUR OWN RADIO SHOP.

You Train at Home by Practicing with Big Kits of Parts I Send

VETERANS

You can get this training right in your own home under G. I. Bill. Mail coupon for full details.

J. E. SMITH, President, National Radio Institute

Do you want a good-pay job in Radio—or your own money-making Radio Shop? Mail coupon for a FREE Sample Lesson and my FREE 64-page book, "How to Be a Success in RADIO—Television, Electronics". See how N.R.I. gives you practical Radio experience at home—building, testing, repairing Radios with BIG KITS OF PARTS I send!

Many Beginners Soon Make Good Extra Money in Spare Time While Learning

The day you enroll I start sending EXTRA MONEY JOB SHEETS. You LEARN Radio principles from my easy-to-grasp, illustrated lessons—PRACTICE what you learn with parts I send—USE your knowledge to make EXTRA money fixing neighbors' Radios in spare time while still learning! From here it's a short step to your own *full-time* Radio Shop or a good Radio job!

Future for Trained Men is Bright in Radio, Television, Electronics

It's probably easier to get started in Radio now than ever before because the Radio Repair Business is booming. Trained Radio Technicians also find wide-open opportunities in Police, Aviation, Marine Radio, Broadcasting, Radio Manufacturing, Public Address work. Think of even *greater* opportunities as Television and Electronics become available to the public! Send for free books now!

Find Out What N.R.I. Can do for You

Mail Coupon for Sample Lesson and my 64-page book. Read the details about my Course. Read letters from men I trained, telling what they are doing, earning. See how quickly, easily you can get started. No obligation! Just MAIL COUPON NOW in an envelope or paste it on a penny postal. **J. E. SMITH, President, Dept. 7FP3, National Radio Institute,** *Pioneer Home Study Radio School,* **Washington 9, D. C.**

I TRAINED THESE MEN

Averages Better Than $3,000 a Year

"I now have a shop and am doing fine. I average better than $3,000 per year, and certainly give NRI much of the credit."—RAYMOND F. DAVIS, Ashburn, Ga.

Made $1,500 While Learning

"By the time I finished my NRI training I had made $1,500. When I started the Course I did not know a resistor from a condenser. I have bought my home. My income from Radio work, etc., is about $3,000. a year." — WILLIAM THOMAS, Baldwyn, Miss.

Full-Time Job Before Finishing Course

"After completing about two-thirds of my Course I entered a Radio Repair shop. Later I branched out for myself and opened a shop in my own home. I am much pleased with the work I had during my first year." A. N. AYERS, Washington 10, D. C.

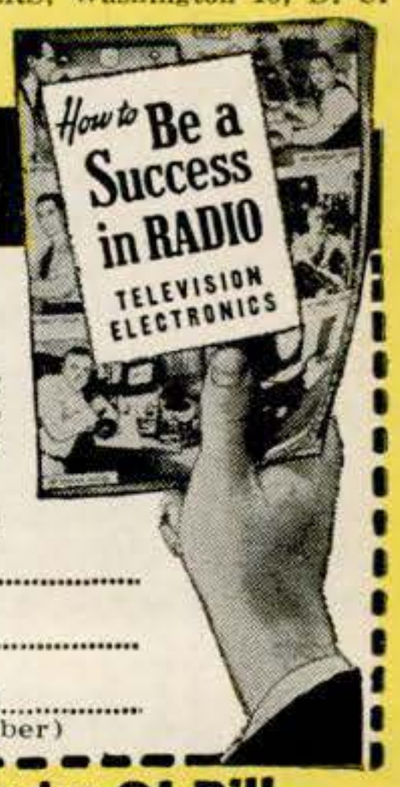
Our 33rd Year of Training Men for Success In Radio

ONE OF MANY RADIO CIRCUITS YOU BUILD

You build this Superheterodyne Circuit and many other Radio circuits with parts I send you. By the time you conduct 60 sets of Experiments, make hundreds of measurements and adjustments—you'll have valuable PRACTICAL experience.

MY COURSE INCLUDES TRAINING IN Television • Electronics

Sample Lesson 64 Page Book **FREE**



J. E. SMITH, President, Dept. 7FP3
National Radio Institute
Washington 9, D. C.

Mail me FREE, without obligation your sample lesson and my 64-page book. (No salesman will call. Please write plainly.)

Age.....

NAME.....

ADDRESS.....

CITY.....STATE.....
(Please include Post Office Zone Number)

Approved for Training under GI Bill

Copyrighted material

KNOWLEDGE
THAT HAS
ENDURED WITH THE
PYRAMIDS

A SECRET METHOD FOR THE MASTERY OF LIFE

WHENCE came the knowledge that built the Pyramids and the mighty Temples of the Pharaohs? Civilization began in the Nile Valley centuries ago. Where did its first builders acquire their astounding wisdom that started man on his upward climb? Beginning with naught they overcame nature's forces and gave the world its first sciences and arts. Did their knowledge come from a race now submerged beneath the sea, or were they touched with Infinite inspiration? From what concealed source came the wisdom that produced such characters as Amenhotep IV, Leonardo da Vinci, Isaac Newton, and a host of others?

Today it is known that they discovered and learned to interpret certain *Secret Methods* for the development of their inner power of mind. They learned to command the inner forces within their own beings, and to master life. This secret art of living has been preserved and handed down throughout the ages. Today it is extended to those who dare to use its profound principles to meet and solve the problems of life in these complex times.

AMENHOTEP IV
Founder of Egypt's
Mystery Schools

This Sealed Book—FREE

Has life brought you that personal satisfaction, the sense of achievement and happiness that you desire? If not, it is your duty to yourself to learn about this rational method of applying natural laws for the mastery of life. To the thoughtful person it is obvious that everyone cannot be entrusted with an intimate knowledge of the mysteries of life, for everyone is not capable of properly using it. But if you are one of those possessed of a true desire to forge ahead and wish to make use of the subtle influences of life, the Rosicrucians (not a religious organization) will send you A Sealed Book of explanation without obligation. This Sealed Book tells how you, in the privacy of your own home, without interference with your personal affairs or manner of living, may receive these secret teachings. Not weird or strange practices, but a rational application of the basic laws of life. Use the coupon, and obtain your complimentary copy.

Use this coupon for **FREE** *copy of book*

SCRIBE V.Z.M.
The Rosicrucians (AMORC)
San Jose, California

Please send free copy of Sealed Book, which I shall read as directed.

NAME.....

ADDRESS.....

CITY.....

The ROSICRUCIANS

SAN JOSE (AMORC) CALIFORNIA

Copyrighted material

Want to be in BUSINESS For YOURSELF

Prepare at Home-- in Spare Time

Learn RADIO

Qualify For a Good Pay Job-or Start Your Own Business Without Capital

Find out about the many money-making opportunities Radio offers you. Learn how you can qualify for a good-pay job or start a business of your own without capital. Send coupon below for my big FREE book, "Your Opportunities in Radio and Television," which tells of radio's vast opportunities and how HOLLYWOOD RADIO & TELEVISION INSTITUTE has been training men for success in Radio through home study, for over 17 years, in over 40 countries, through its proven 2-WAY METHOD—LESSONS PLUS HOME SHOP PRACTICE!

BELOW You build this A. C. Power Supply. (Experiment No. 155)

ABOVE — You build this Multi-purpose Shop Test Panel. 5 Test instruments in one.

ABOVE — You build transformer coupled audio stage. (Experiment No. 260)

My 2-Way Method (Lessons *plus* practical experience) helps you get into Radio Quicker.

LEFT—You build this tuned radio stage, regenerative detector and audio amplifier. (Experiment No. 329)

You Get 9 KITS OF RADIO PARTS ★ You Learn By Doing
You Do Over 300 Fascinating Tests ★ You Keep All Kits!

My regular course shows you the "Whys" of radio. My Home Work Shop Experimental Course shows you the "Hows" of radio, first hand—by doing. Thus you lean more thoroughly—quicker.

HOLLYWOOD IS A WORLD CENTER

of radio broadcasting and manufacture-television-motion picture production. Thus, H. R. T. I. is in an excellent location to bring you modern, up-to-the-minute instruction. Before you decide on any course you owe it to your future to find out about H. R. T. I. training. Read what graduates in 40 different countries say about this famous course.

BIG BOOK FREE

Just paste coupon on a postcard or send in envelope for free big fully illustrated book "Your Opportunities in Radio, Television and Electronics" and explaining the advantages of HRTI training. No salesman will call.

HOLLYWOOD RADIO & TELEVISION INSTITUTE
810 West 6th Street, Los Angeles 14, California

MANY H.R.T.I. STUDENTS EARN MONEY IN SPARE TIME WHILE LEARNING

From the very start, through special "Spare Time Work Sheets," I show you how to earn money in spare time by doing good-pay radio jobs that abound in nearly every neighborhood. Many students earn $5, $10, and more a week while learning. A mighty good way to lay the foundation for a future radio business of your own.

Now is the time to start preparing for YOUR career in this fast-growing industry. Take the first step—send coupon for my big FREE Book today.

MAIL COUPON NOW

C. H. Mansfield, President, Dept. D 5
HOLLYWOOD RADIO & TELEVISION INSTITUTE
810 WEST 6TH ST., LOS ANGELES 14, CALIF.

Send me your FREE book, "Your Opportunities in Radio, Television and Electronics" which explains your 2-way home study training method. (No salesman will call.)

Name_____ Age_____

Address_____

City_____ Zone_____ State_____

Air Mail Reaches Me Overnight

Copyrighted material

THE GOOD THINGS OF LIFE

FIND OUT ABOUT OPPORTUNITIES IN INDUSTRIAL ELECTRONICS

It's a perfectly natural human desire to want more money, a better job, prestige and all the other good things of life. Who gets them? Look about you. Success you will see, comes to the man who is trained for his job.

A new world of opportunity is today beckoning to ambitious men. One of the most important and exciting fields is **INDUSTRIAL ELECTRONICS.** It is attracting experienced electrical men as well as younger fellows seeking a way to bigger earnings and a more secure future.

OPPORTUNITY LIES AHEAD

Industrial Electronics is not Radio. It has nothing to do with radio transmitters and receivers. It is totally new application of electric power, applied to modern production by means of the magic of the vacuum tube. Everywhere industrial electronic devices are replacing the old-time electrical controls, and processes. Industrial Electronics is Modern Industrial Electricity.

"Every electrician should know—must know—Industrial Electronics." That's what many Union leaders are telling their members, today. They know that the use of Industrial Electronics devices is growing by leaps and bounds. They know that to install and service this equipment, even the best of present-day electricians must first have had special training.

GET READY NOW!

Now is the time to get into Industrial Electronics, while the field is in its infancy . . . and while it is rapidly developing a need for thousands of trained experts. Tomorrow's leaders are training today.

And here is a School equipped in every way to train you for Industrial Electronics work—one of the largest and most completely equipped, and one of the few of its kind in America—a School that already has trained thousands of men for industrial opportunities.

LEARN AT HOME OR COME TO OUR SCHOOL

Learn Industrial Electronics—now, while the time is ripe. You don't need any advanced schooling or previous experience. If you are at all mechanically inclined and have gone to high school for at least one year or have an equivalent education, we can teach you Industrial Electronics.

You can take most of your training at home, in your spare time—or you can come to Chicago and take your entire training in our completely equipped shops and laboratories. Either way you quickly acquire the fine points, practical skill, and broad, technical "know how" that makes the expert Industrial Electronics Technician.

A GUIDE FOR YOUR FUTURE—Complete facts about Industrial Electronics. Packed with pictures. Tells all about our successful training plan. Coupon will also bring details about moneymaking opportunities for trained men and our Life-Time Free Employment Service. No obligation. Mail coupon TODAY. Investigation may start you up the ladder of Success.

AUTHORIZED TO ACCEPT VETERANS FOR G.I. TRAINING

INDUSTRIAL TRAINING INSTITUTE,
2150 Lawrence Ave., Dept. P2SL Chicago 25, Ill.

Please send me, FREE, your "Camera Visit" booklet and information about the opportunity for trained men in INDUSTRIAL ELECTRONICS. It is understood that I will be under no obligation.

NAME.....

ADDRESS.....

CITY.....STATE.....

ARE YOU A VETERAN?.....

NOW YOU CAN GET THOSE

MOTOR - CLUTCH - TRANSMISSION & AXLE PARTS IN STOCK

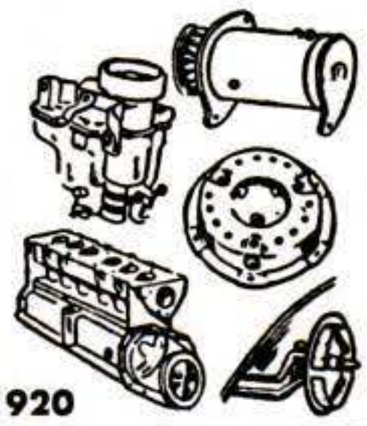
Why worry about parts when we have them. All you want at a BIG SAVING. We ship within 48 hours. We also have REBUILT UNITS for EXCHANGE at Bargain Prices: CARBURETORS—FUEL PUMPS—GENERATORS—STARTERS—SHOCKS & KNEES. It will pay you to GET OUR PRICES.

—RUSH YOUR ORDERS—

If Car Owner Specify Make

• NEW • AUTO PARTS

and **SAVE MONEY** Get Our **BARGAIN PRICE LIST** for parts you want



Est. 1920

IMMEDIATE SHIPMENT

MECHANICS AUTO PARTS, Factory Warehouse,
3807 No. Ashland Ave., Dept. PS-6 CHICAGO 13

INDIANA TECHNICAL COLLEGE

B.S. degree in 27 mos. Aeronautical, Chemical, Civil, Electrical, Mechanical and Radio Engineering. 2-yr. diploma. Air Conditioning, Refrigeration, GI approved. Low rate. Earn board. Demand for grads. Enter June, Sept., Dec., March. Catalogue. **667 E. Washington Blvd., Ft. Wayne 2, Ind.**

INDIANAPOLIS "500" RACE HISTORY BOOK

352 pages, 1100 illustrations. Covers every race since 1909. Postpaid $3.50; cloth-bound $5.00. 32-page book on 1946 race only, $1.00. Book on 1947 race (ready in July) $1.00. **CLYMER, Dept. B-6, 2125 W. Pico, Los Angeles 6, Calif.**

Learn PHOTOGRAPHY at Home

Splendid opportunities. Prepare in spare time. Practical basic training. Long-established school. Send for free book, "Opportunities in Photography." No obligation.

American School of Photography, 1315 S. Michigan Ave., Dept. 136-A Chicago 5, Ill.

FREE 5 INCH GENUINE LEATHER Jolly Rogers Patch

Join the **Jolly Rogers Club** of **Insignia Collectors.** Send only $1.00 and get this **Genuine Leather Jolly Roger Breast Patch Free** with 25 all different **Air Force Wings** and **Officers Collar Insignia.** (List Price $5.00.) Colored Insignia Book FREE with order.

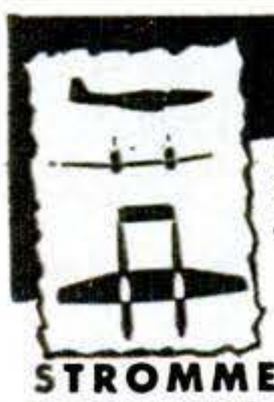
The Insignia Mart, Dept. B-11,
703 Broadway New York 3, N. Y.

LEARN IMPORT-EXPORT

Represent manufacturers. Study at home. Splendid opportunities, uncrowded field, big future. ITP trains you in few weeks. Low tuition. Diploma awarded.

INTERNATIONAL TRADE PROMOTION
246-S Fifth Ave. New York 1, N. Y.

KNOW YOUR PLANES!



Over 100 3-view engineering drawings of latest military, commercial and private aircraft! Includes jets, super bombers, technical data! Only folder of its kind . . . large size . . . authentic . . . accurate.

ONLY $1.00 *Post Paid*

STROMME, BLACK AND ASSOCIATES
2328 W. 7th Street D, Los Angeles 5, California

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women

Prepare NOW for next Examinations Vets Get Preference Mail Coupon today sure

COUPON

FRANKLIN INSTITUTE
Dept. J80, Rochester 4, N. Y.

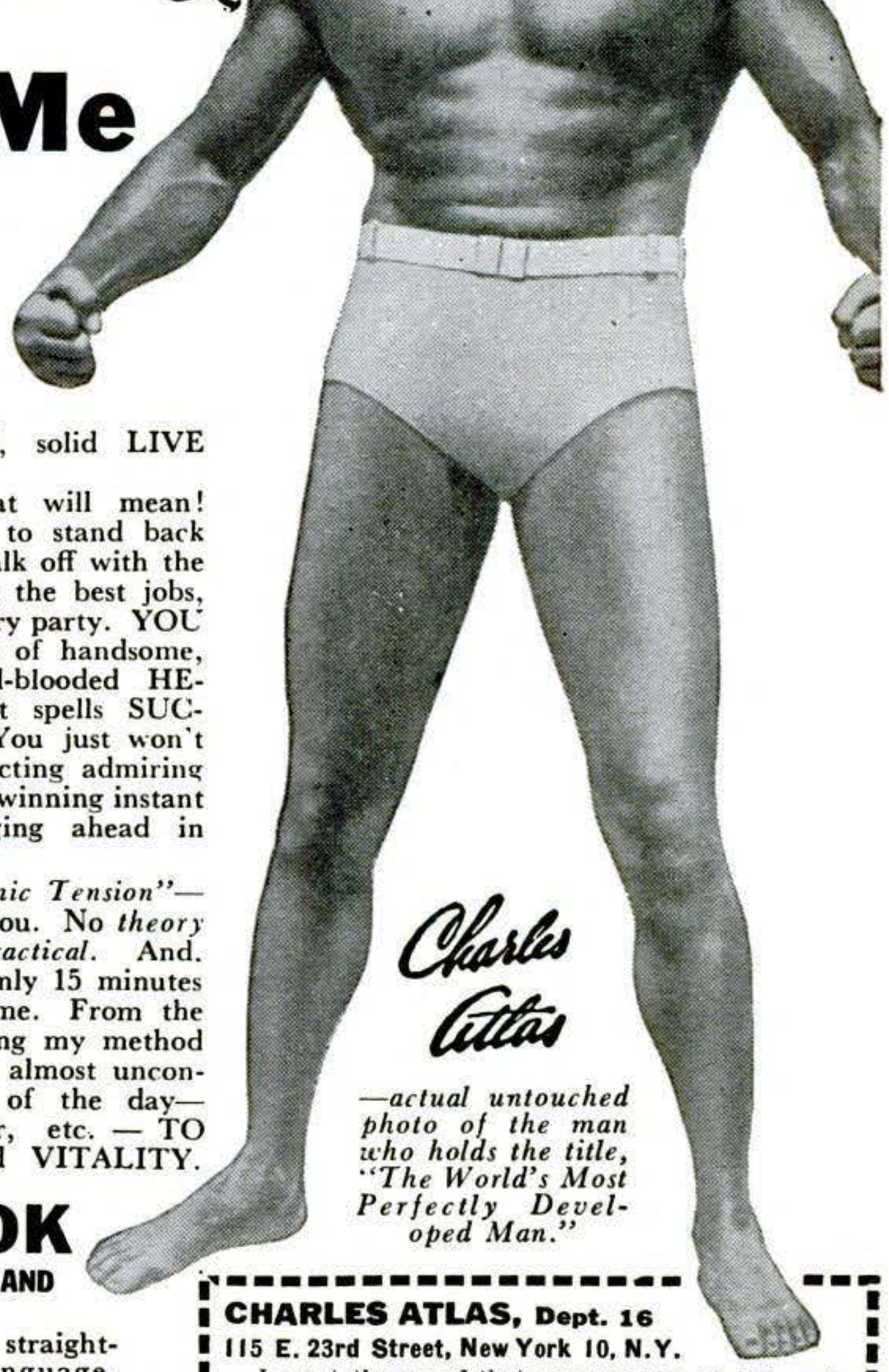
Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....

Address.....*Vet?*....

Copyrighted material

Stop DAY-DREAMING about getting a New Body!



—actual untouched photo of the man who holds the title, "The World's Most Perfectly Developed Man."

Start Now! Let Me Prove I Can Make You a NEW MAN

IN ONLY 15 MINUTES A DAY I can put a handsome, rippling coat of muscle all over your body! *Wishing* for superhuman strength and red-blooded vigor won't GIVE them to you. You may be sick and tired of letting other, huskier fellows "lord it over you"—but until you're willing to DO something about it, you'll never get anywhere!

But if you'll give *me* just FIFTEEN MINUTES A DAY—I'LL PROVE I CAN BUILD YOU A POWERFUL NEW BODY! I can make you feel so *strong* and *alive* you'll laugh at fatigue! Let me give you a battering-ram punch, develop your shoulders and back into a tough wall of solid muscle, build you a tough, supple belt of punch-proof stomach muscles, re-make your legs into young "tree trunks" of strength and flexibility. Let me pump *real HE-MAN power* into every part of your body—INSIDE AND OUTSIDE! Only 15 minutes a day—right in your own home!—is all I ask. And there's no cost if I fail.

What's My Secret?

"Dynamic Tension!" That's the ticket! The identical *natural* method that I myself developed to change my body from a scrawny, skinny-chested weakling to my present prize-winning physique! Thousands of other fellows are becoming marvelous physical specimens—*my way*—*"Dynamic Tension."* You simply utilize the DORMANT muscle-power in your own God-given body—watch it increase and multiply double-quick into real, solid LIVE MUSCLE.

Just think what that will mean! You'll no longer have to stand back and let other fellows walk off with the prettiest girls, step into the best jobs, grab the spotlight at every party. YOU can now have the kind of handsome, healthy body and red-blooded HE-MAN VITALITY that spells SUCCESS in every way! You just won't be able to HELP attracting admiring looks wherever you go—winning instant attention—steadily forging ahead in life!

My method—*"Dynamic Tension"*—will turn the trick for you. No *theory*—every exercise is *practical*. And, man, *so easy!* Spend only 15 minutes a day in your own home. From the very start you'll be using my method of *"Dynamic Tension"* almost unconsciously every minute of the day—walking, bending over, etc. — TO BUILD MUSCLE and VITALITY.

FREE BOOK

"EVERLASTING HEALTH AND STRENGTH"

In it I talk to you in straight-from-the-shoulder language. Packed with inspirational pictures of myself and pupils—fellows who became NEW MEN in strength, my way. Let me show you what I helped THEM do. See what I can do for YOU! For a real thrill, send for this book today, AT ONCE. CHARLES ATLAS, Dept. 16, 115 E. 23rd St., New York 10, N. Y.

CHARLES ATLAS, Dept. 16
115 E. 23rd Street, New York 10, N.Y.

I want the proof that your system of *"Dynamic Tension"* can help make me a New Man—give me a healthy, husky body and big muscle development. Send me your FREE book, "Everlasting Health and Strength." No obligation.

Name.....Age.....
(Please print or write plainly)

Address.....

City.....

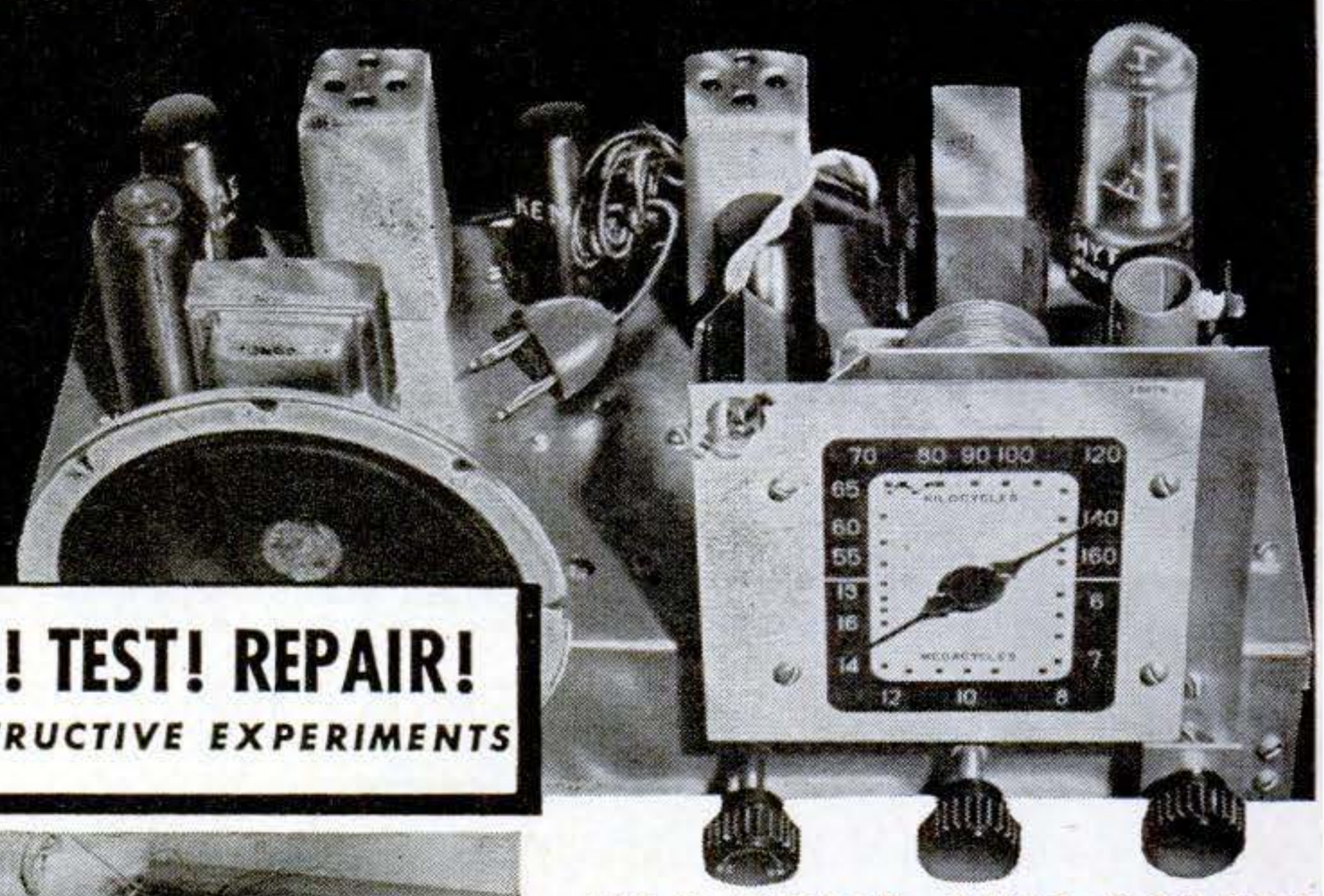
Copyrighted material

NOW! An Amazing Opportunity to LEARN RADIO AT HOME

I SEND YOU 8 BIG KITS OF RADIO PARTS

Including a COMPLETE 6 TUBE SUPER-HETERODYNE RECEIVER

I TRAIN YOU RIGHT by PUTTING YOU TO WORK with REAL PROFESSIONAL EQUIPMENT!



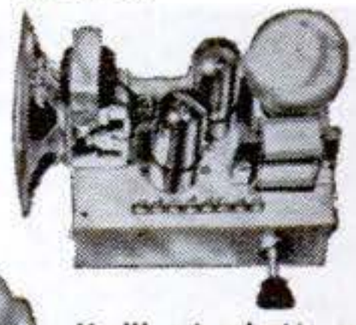
LEARN HOW TO BUILD CIRCUITS! TEST! REPAIR!

YOU DO OVER 175 INSTRUCTIVE EXPERIMENTS

YOU BUILD THIS USEFUL TEST EQUIPMENT!

I give you a fine, moving-coil type Meter Instrument on Jewel Bearings — with **parts for a complete Analyzer Circuit Continuity Tester. You learn how to check and correct Receiver defects with professional accuracy and speed.**

Soldering, wiring, connecting Radio parts . . . building circuits — you can't beat this method of learning. When you construct this Rectifier and Filter, Resistor and Condenser Tester, etc., you get a really practical slant on Radio.



You'll get valuable experience and practice building this Signal Generator and multi-purpose Tester. Makes a breeze out of fixing Radios and you don't have to spend money on outside, ready-made equipment.

HERE'S THE EASIEST, MOST PRACTICAL WAY OF ALL TO PREPARE FOR GOOD PAY in RADIO ELECTRONICS and TELEVISION!

I train your mind by putting you to work with your hands on a big 6-Tube Superheterodyne Receiver. And, believe me, when you get busy with real Radio Parts — 8 big Kits of them — you really LEARN Radio and learn it RIGHT! You get the practical stuff you need to be useful in Radio, and that's what it takes to make money. You don't have to worry about what to do with these 8 Kits of Parts. Step by step, I show you how to build circuits, test, experiment, trouble-shoot. And you don't need any previous experience. The Sprayberry Course starts right at the beginning of Radio! You can't get lost! Simplified lessons, coupled with real "Shop" practice, makes every subject plain and easy to understand and remember. Soon after you begin Sprayberry Training, I'll send you my sensational BUSINESS BUILDERS.

A BUSINESS OF YOUR OWN . . . OR A GOOD RADIO JOB

You'll find out how to get and do neighborhood Radio repair jobs for nice profits and rich experience while learning. This sort of work can easily pave the way for a Radio Service business of your own. But with Sprayberry Training, you're not limited. You can swing into any one of the swiftly expanding branches of Radio-Electronics INCLUDING Radio, Television, FM, Radar, Industrial Electronics. Be wise! Decide now to become a fully qualified RADIO - ELECTRONICIAN. Get full details about my Training at once! Mail coupon below for my 2 big FREE Books.

GET THESE VALUABLE FREE BOOKS

"How to Read Radio Diagrams and Symbols"

Here's a valuable and wonderfully complete new book which explains in simple English how to read and understand any Radio Set Diagram. Includes translation of all Radio symbols. Send for this volume at once. It's free! Along with it, I will send you another Big Free book describing in detail my Radio-Electronic Training.

RUSH COUPON!

SPRAYBERRY ACADEMY OF RADIO
F. L. Sprayberry, President, Room 5567, Pueblo, Colorado

Please rush my FREE copies of "How to MAKE MONEY in RADIO, ELECTRONICS and TELEVISION," and "HOW to READ RADIO DIAGRAMS and SYMBOLS."

Name ..... Age .....

Address .....

City ..... State .....

(Mail in envelope or paste on penny postcard)

Copyrighted material

INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the U. S. Patent Office. For that reason, the Patent Office advises the inventor to engage a competent registered patent attorney or agent to prepare his application for patent and represent him before the U. S. Patent Office Examiner.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY B. JACOBSON
Registered Patent Attorneys
72F District National Bldg., Washington 5, D. C.

Please send me copy of "Patent Guide for the Inventor" and also "Record of Invention" form. This request does not obligate me.

Name_____

Address_____

City_____ State_____

(Please write or print plainly.)

Patents

Trademarks

Copyrights

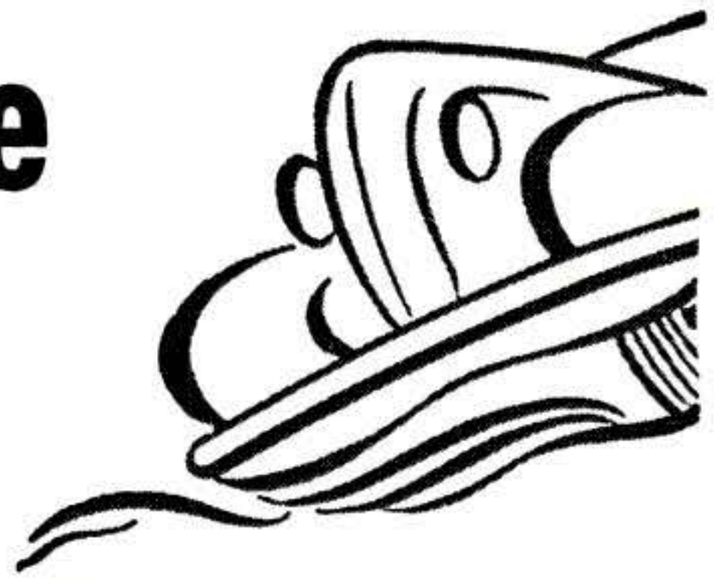
Registered Patent Attorneys

CLARENCE A. O'BRIEN & HARVEY B. JACOBSON

72F District National Building + Washington 5, D. C.

Copyrighted material

Keep your car "feeling good" inside with PYROIL



• Proper lubrication is a 'round the clock necessity for your car. When standing idle, cylinder walls must be protected from corrosion; when starting, a smooth oil film should prevent friction and wear. Pyroil gives oil the property of adhering to metal surfaces—it reduces wear, it prevents corrosion, it removes carbon and sludge formations.

To add miles to your car, ask your gas station attendant to add PYROIL.

PYROIL FOR AIRCRAFT ENGINES

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

Manufactured and Guaranteed by Pyroil Company, 226 Main Street, La Crosse, Wisconsin

PYROIL COMPANY
226 Main Street
La Crosse, Wisconsin

I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

Name.....

Address.....

City or Town.....State.....

Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL Company. Picture of Jerry sent on request.

LETTERS

On Behalf of Safety

Sir:

The article by Devon Francis on "Cars Can Be Safer" in the April issue of your excellent magazine is not only interesting reading, but in addition qualifies as a valuable public service. It directs attention to a major factor in automobile accidents which has been consistently and persistently overlooked—the one common factor in all automobile accidents: the car itself. . . .

If it would cost a little more to design and build safer cars, that cost would be little compared to the $2,500,000,000 economic loss suffered every year in auto accidents. Furthermore, with cars designed for maximum safety, savings could be made on the great sums expended for traffic regulation and road engineering.

Your article clears the air. The question is, what price safety?

ARTHUR W. STEVENS
President,
Automobile Safety Association
Boston, Mass.

PSM appreciates Mr. Stevens' praise. A letter from him originally inspired the idea for an article on safer cars.

Sir:

. . . You show a car being blocked out by a large corner post. If this post were made of transparent plastic, there would be no danger of blocking the driver's vision of a car or a person.

IVAN GOLDBERG
Brooklyn, N. Y.

Sir:

Both article and editorial note on safer cars take a commendable attitude, but everyone combating this evil misses the main cause. All main roads should be one way. At the next Indianapolis race, let's have half the cars travel in one direction, the other half in the opposite direction. Hazardous, you say? But isn't that just what everyone

Copyrighted material

INVENTORS

Patent Laws Encourage The Development Of Inventions

The Rules of Practice of the U. S. Patent Office advises—unless an inventor is familiar with such matters—that he employ a competent registered attorney or registered agent, as the value of patents depends largely upon the skillful preparation of the specifications and claims.

The firm of McMorrow, Berman and Davidson is registered to practice before the U. S. Patent Office. Additionally, it maintains a staff of attorneys able to readily understand inventors' disclosures, to advise concerning patentability, and to prepare appropriate specifications and claims for filing with the Patent Office.

If an inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Where such report indicates that the invention appears patentable, in order to secure protection, diligence should be exercised in making application for a patent.

McMORROW, BERMAN & DAVIDSON

Registered Patent Attorneys

PATENTS — TRADE MARKS — COPYRIGHTS

1425 VICTOR BUILDING, WASHINGTON 1, D. C.

McMORROW, BERMAN & DAVIDSON
Registered Patent Attorneys
1425 Victor Building, Washington 1, D. C.

Send me further particulars as to patent protection and procedure and "Invention Record" form at once. I understand that this request does not obligate me.

Name.....

Address.....

City.....State.....

(WRITE OR PRINT NAME CLEARLY)

Copyrighted material

"Haven't got what it takes? Who? ME?"

Yes, it often *is* a shock to discover what others really think about you. And while they may be completely wrong, still . . .

Why not *prove* that you're going places —why not make more money?

Do you *dare* say you lack the opportunity when thousands are winning raises, promotion, through LaSalle's new home-study training?

Let us send you free that fascinating book: "Ten Years' Promotion in One." Write for it *today!* There's no obligation—nothing but a challenge, an inspiration, that can make money for you!

G. I. APPROVED

Ask also for one of these interesting books on *your* chosen field.

LaSalle Extension University

A Correspondence Institution

Dept. 683-R 417 South Dearborn Street, Chicago 5

Please send me, without cost or obligation, "Ten Years' Promotion in One" and also the book on the business field checked below:

☐ Accountancy ☐ Law ☐ Traffic Mgt.
☐ Business Mgt. ☐ Modern Salesmanship

*Name*_____

*Address*_____

*City*_____ *State*_____

is doing, passing six inches apart at 60 m.p.h.?

J. O. WIGGENJOST

Lincoln, Nebr.

For the Modelmaker

Sir:

I am writing in appreciation of your recent policy of publishing plans and specifications for model projects outside the ordinary run of aircraft, racing cars and railroads. I have completed the model of the wood-burning "Old Ironsides," and it makes a very nice job. At present, I have almost completed George Washington's coach, and I think it will be a prize. . . . Keep this feature up, and please don't make them too hard or too easy. The two I have worked on are just about right for "table-top" builders.

E. F. DUTTON

Winnipeg, Man.

Still Aiming for the Moon

Sir:

Regarding your March article on "How You'll Fly to the Moon": I have read in chemistry books that water converted into steam and then passed through a superheated iron pipe is cracked into hydrogen and oxygen. Would there be a chance that this principle would work, together with the atomic-rocket idea? The H_2O given off could be burned as the propellent charge.

WILLIAM S. CRUMP

New Albany, Ind.

The necessary equipment would probably weigh considerably more than tanks of liquid hydrogen. Besides, if hydrogen and oxygen were burned, it would be a chemical rocket, not an atomic one. Atomic rockets won't burn hydrogen—they'll just heat it up a lot.

Something Had to Give

Sir:

What happened to the "Letters" department in the April issue?

J. T. PROCTOR, JR.

New York, N. Y.

The paper shortage is still with us, and "Letters" paid the penalty.

Copyrighted material

AUDELS REFRIGERATION & AIR CONDITIONING GUIDE.....$4

New from Cover to Cover—1280 Pages, Fully Illus. Covering basic principles, servicing, operation & repair of household, commercial & industrial refrigeration & air conditioning. A gold mine of essential important facts for engineers, servicemen, users.

AUDELS CARPENTERS & BUILDERS GUIDES—4 Vols. $6

A practical illustrated trade assistant on modern construction for carpenters, joiners, builders, mechanics and all woodworkers. 4 vols., 1600 pages, 3700 illustrations, flexible covers. Pocket size. Each volume sold separately $1.50 a vol.

AUDELS AUTOMOBILE GUIDE.....$4

A practical quick ready reference book for auto mechanics, service men, operators & owners. Explains theory, construction & servicing of modern motor cars, trucks, buses & auto type Diesel engines. 1540 pages, fully illustrated. 55 chapters. Indexed. A standard book for mechanics. New fluid drive covered.

AUDELS DIESEL ENGINE MANUAL.$2

A practical, concise treatise with questions and answers on the theory, operation and maintenance of modern diesel engines including General Motors 2 cycle Diesel. 384 pages, fully illus., flexible binding, pocket size. All details plainly brought out, this book is of extreme value to engineers, operators & students.

AUDELS WIRING DIAGRAMS.....$1

210 Pages. Illustrated. Gives practical facts on wiring of electrical apparatus. It shows clearly how to wire apparatus for practically all fields of electricity. Each diagram is complete & self-explanatory. Highly Endorsed Pocket Companion.

AUDELS PLUMBERS & STEAMFITTERS GUIDES—4 Vols. $6

A Practical Trade Assistant & Ready Reference. Explains in plain language & by clear illustrations, diagrams, charts, graphs, pictures principles of modern plumbing practice including Marine Pipe Fitting and Air Conditioning. 4 Vols.—1670 Pages—3642 Diagrams. Pocket size. Each Vol. Sold Separately $1.50 a Vol.

AUDELS SHEETMETAL WORKERS HANDY BOOK.....$1

Practical inside information. Fundamentals of Sheet Metal Work. 388 pages. Illustrated. 11 sections. Clearly written. Essential & important facts, figures, pointers in everyday language. Ref. Index.

AUDELS SHEETMETAL PATTERN LAYOUTS.....$4

Developed by Experts for Sheet Metal Workers, Layout Men & Mechanics. A Practical Encyclopedia in 10 Sections, size 7 x 10 x 2—1125 Pages—350 Layouts—1600 Illustrations. 1001 Key Facts. Fully indexed for ready reference in answering your layout problems. Covers all phases of sheet metal work including Pattern Cutting, Pattern Development & Shop Procedure.

AUDELS ANSWERS ON BLUE PRINT READING.....$2

For Mechanics & Builders. Covers all types of blue print reading including ship & airplane. 376 pages, fully illustrated.

AUDELS NEW MACHINIST & TOOLMAKERS HANDY BOOK....$4

Covers modern machine shop practice in all its branches. 5 practical books in 1. New from cover to cover. Tells how to set up & operate lathes, screw and milling machines, shapers, drill presses and all other machine tools. 1600 pages, fully illustrated, 5 x 6½ x 2. Indexed. 5 sections. 1—Modern Machine Shop Practice. 2—Blue Print Reading & How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule. 60 chapters. Easy to read and understand. A shop companion that answers your questions.

AUDELS MATHEMATICS & CALCULATIONS FOR MECHANICS $2

Mathematics for home study or reference. 700 pages, 550 illus. Practical mathematics from beginning. How to figure correctly. Easy, correct methods covering a complete review. Ill. & Indexed.

AUDELS HANDY BOOK OF PRACTICAL ELECTRICITY $4

For maintenance engineers, electricians & all electrical workers. 1440 Pages, 2600 Illus. Covers important electrical information in handy form—including Marine Wiring, Radio Principles, Welding. Indexed. A Key to a practical understanding of electricity.

AUDELS RADIOMANS GUIDE.....$4

A key to the practical understanding of radio including Frequency Modulation, Television, etc., Aircraft & Marine Radio. For radio engineers, servicemen, amateurs. 772 pages. 400 Illustrations & Diagrams. Photos. Review Questions & Answers, Reference Index. Authentic, clear, concise.

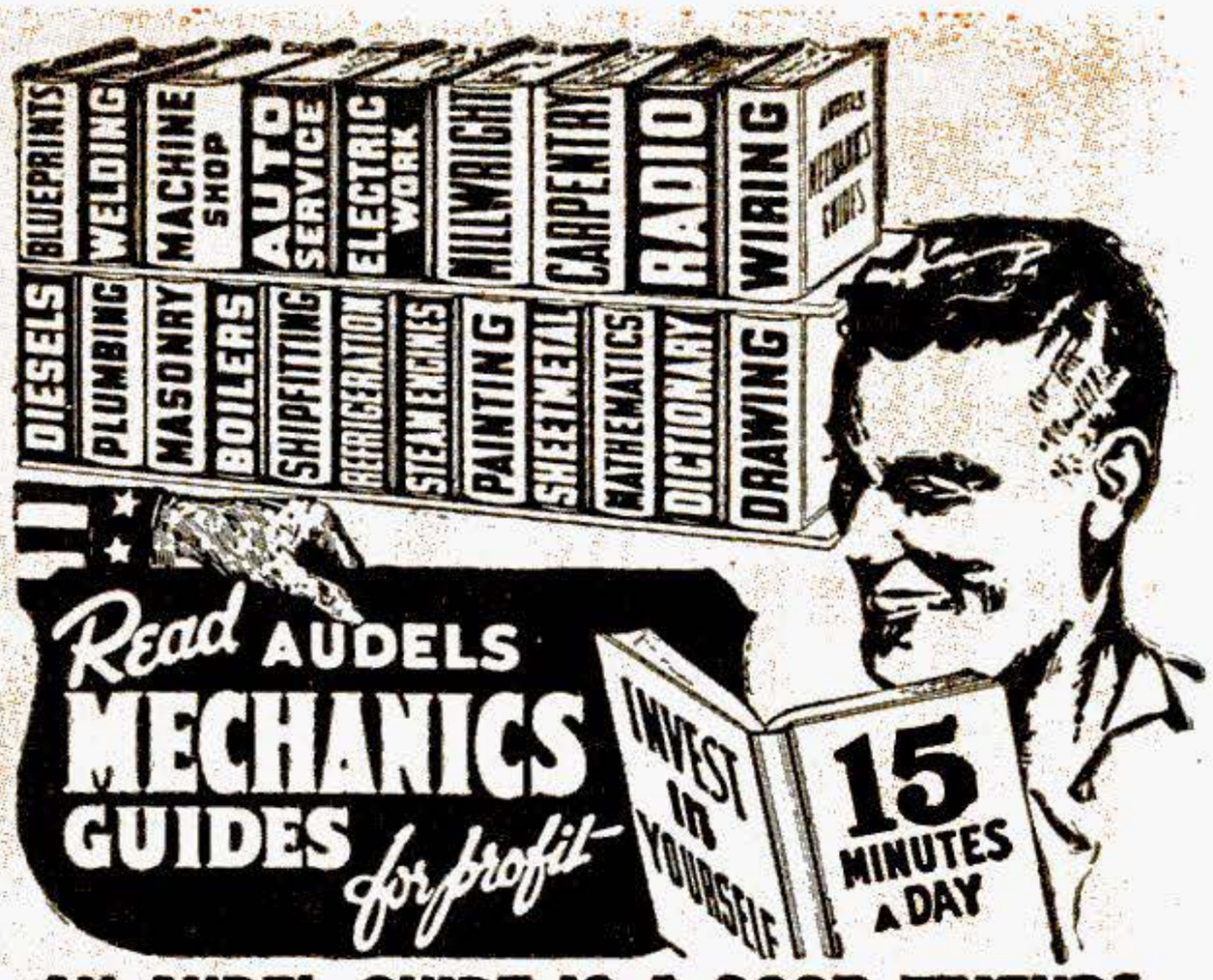
AUDELS ELECTRONIC DEVICES....$2

Tells What You Want to Know About Electric Eye. Easily Understood. Covers photo-electric cells & their applications. Amplifiers, illumination, frequencies, voltage, photocell, tubes, Ohm's Law, wiring diagrams, etc.

AUDELS WELDERS GUIDE.....$1

A concise, practical text on operation & maintenance of all welding machines for all mechanics. Over 400 pages, illustrated. Covers all methods of electric and acetylene welding including airplane work.

AUDEL, Publishers, 49 W. 23 St., N. Y. 10



AN AUDEL GUIDE IS A GOOD FRIEND!

Use the brains and experience of others in these Guides of the Trades. Save time and money with right methods, short cuts, labor saving ideas. CHECK NOW! You can look over any Audel Guide in your home. Start the Easy Payments if satisfied.

CUT HERE

MAIL ORDER

THEO. AUDEL & CO., 49 W. 23 St., New York 10, N.Y.

Please mail me for 7 days' free examination the books marked (X) below. I agree to mail $1 in 7 days on each book or set ordered, and to further mail $1 a month on each book or set ordered until I have paid purchase price.

If I am not satisfied with Guides I will return them.

- ☐ Audels ELECTRIC MOTOR GUIDE . . . . . $4.
- ☐ Audels OIL BURNER GUIDE . . . . . 1.
- ☐ Audels REFRIGERATION & Air Conditioning Guide. 4.
- ☐ Audels POWER PLANT ENGINEERS GUIDE . . . 4.
- ☐ Audels PUMPS, HYDRAULICS & AIRCOMPRESSORS 4.
- ☐ Audels WELDERS GUIDE . . . . . 1.
- ☐ Audels BLUE PRINT READING . . . . . 2.
- ☐ Audels SHEET METAL WORKERS Handy Book . . 1.
- ☐ Audels SHEET METAL PATTERN LAYOUTS . . . 4.
- ☐ Audels AIRCRAFT WORKER . . . . . 1.
- ☐ Audels MATHEMATICS and CALCULATIONS . . . 2.
- ☐ Audels MACHINISTS & TOOLMAKERS Handy Book 4.
- ☐ Audels MECHANICAL Dictionary . . . . . 4.
- ☐ Audels AUTOMOBILE GUIDE . . . . . 4.
- ☐ Audels DIESEL ENGINE MANUAL . . . . . 2.
- ☐ Audels MARINE ENGINEERS Handy Book . . . . 4.
- ☐ Audels MECHANICAL DRAWING GUIDE . . . . 1.
- ☐ Rogers MECHANICAL DRAWING and DESIGN . . 2.
- ☐ Audels MILLWRIGHTS and Mechanics Guide . . . 4.
- ☐ Audels CARPENTERS and Builders Guides (4 vols.) . 6.
- ☐ Audels PLUMBERS and Steamfitters Guides (4 vols.) 6.
- ☐ Audels MASONS and Builders Guides (4 vols.) . . . 6.
- ☐ Master PAINTER and DECORATOR . . . . . 2.
- ☐ Audels GARDENERS & GROWERS GUIDES (4 vols.) 6.
- ☐ Audels ENGINEERS & FIREMANS EXAMINATIONS 1.
- ☐ Audels ENGINEERS and Mechanics Guides Nos. 1, 2, 3, 4, 5, 6, 7 and 8 complete . . . . . 12.
- ☐ Audels Answers on Practical ENGINEERING . . . 1.
- ☐ Audels ELECTRICIANS EXAMINATIONS . . . . 1.
- ☐ Audels WIRING DIAGRAMS . . . . . 1.
- ☐ Audels Handy Book of PRACTICAL ELECTRICITY . 4.
- ☐ Audels ELECTRICAL POWER CALCULATIONS . . 2.
- ☐ Audels ELECTRONIC DEVICES . . . . . 2.
- ☐ Audels ELECTRIC Dictionary . . . . . 2.
- ☐ Audels RADIOMANS GUIDE . . . . . 4.
- ☐ Audels NEW ELECTRIC LIBRARY at $1.50 a Volume Vols. I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII

Name _____

Address _____

Occupation _____

Employed by _____ PSM

NOW! ALL 5 FAMOUS JOWETT COURSES—1 COMPLETE MUSCLE BUILDING VOLUME!
FOR ONLY 25¢
AND MY PHOTO BOOK OF FAMOUS STRONG MEN! FREE!
LET ME PROVE I can make YOU
COMMANDO-TOUGH
OR IT WON'T COST YOU A CENT!
says George F. Jowett WORLD'S GREATEST BODY BUILDER

GIVE ME 10 MINUTES A DAY
Learn My Time Tested Secrets Of Strength

I'll teach you the "Progressive Power Method" through which I rebuilt myself from a physical wreck the doctors condemned to die at 15, to the holder of more strength records than any other living athlete or teacher! "Progressive Power" has proven its ability to build the strongest, handsomest men in the world. And I stand ready to show you on a money back basis—that no matter how flabby or puny you are I can do the same for you right in your own home. Let me prove I can add inches to your arms, broaden your shoulders, give you a man-sized chest, powerful legs and a Rock-like back—in fact, power pack your whole body so quickly it will amaze you! Through my proven secrets I bring to life new power in you inside and out, until YOU are fully satisfied you are the man you want to be.

PROVE IT TO YOURSELF IN ONE NIGHT
Send only 25c for my 5 easy-to-follow, picture-packed courses now in 1 complete volume "How to Become a Muscular He-Man". Try it for one night! Experience the thrilling strength that surges through your muscles.

10 DAY TRIAL
Think of it—all five of these famous courses now in one picture-packed volume for only 25c. If you're not delighted with this famous muscle-building guide – if you don't actually FEEL results within ONE WEEK, send it back and your money will be promptly refunded!

PHOTO BOOK OF FAMOUS STRONG MEN!
FREE!
Photos that inspire you to might and muscle. Free with order.

I am making a drive for thousands of new friends fast —REGARDLESS OF COST!
SO GET NOW MY
5 (Valued at $5 each) Muscle Building COURSES
All in 1 Great Complete Volume Packed with How-to-do-it Pictures!
For only 25c
Now, this "get-acquainted", extremely low price of only 25c is a chance to build a body you'll be proud of: Follow Jowett's easy method of muscle building NOW!

HOW TO MOLD MIGHTY LEGS
HOW TO MOLD A MIGHTY BACK
HOW TO MOLD A MIGHTY ARM
HOW TO MOLD A MIGHTY CHEST
HOW TO MOLD A MIGHTY GRIP
HOW TO BECOME A MUSCULAR HE-MAN
with these 5 Complete Courses on Molding
1. A Mighty Arm
2. A Mighty Grip
3. A Mighty Chest
4. A Mighty Back
5. Mighty Legs

FREE GIFT COUPON!
JOWETT INSTITUTE OF PHYSICAL CULTURE
Dept. PS-76
230 Fifth Avenue, New York 1, N. Y.
George F. Jowett:—Please send by return mail, prepaid, FREE Jowett's Photo Book of Strong Men, along with all 5 Muscle Building Courses. 1. Molding a Mighty Chest. 2. Molding a Mighty Arm. 3. Molding a Mighty Grip. 4. Molding a Mighty Back. 5. Molding Mighty Legs—Now all in One Volume "How to Become a Muscular He-Man". Enclosed find 25c. NO C.O.D.'S.
George F. Jowett Champion of Champions
NAME.....AGE.....
(Please Print Plainly, Include Zone Number)
ADDRESS.....

Where's Newton?

Sir:

On page 77 of your March issue, you ask if a rock placed in a tank of water will weigh more, less or the same as the rock and the tank of water separately. You state that they will weigh the same. Actually, the combination will weigh less. When the rock is added, the water level in the tank is raised, and with it the center of gravity of the whole combination. From Newton's law of gravitation, the attraction between two bodies varies inversely as the square of the distance between their centers of gravity. In this case, the distance is increased (i.e., the distance from the center of gravity of the combination to the center of the earth), so the attraction, and hence the weight, will be less.

ROBERT SQUIRES

Toronto, Ont.

Sir Isaac himself would have to agree that the principle is correct, but PSM is willing to bet that he wouldn't have bothered about trying to calculate the difference. How much is infinitesimal?

Giving Jupiter His Due

Sir:

. . . Since the discovery of the two new satellites of Jupiter was made nearly 10 years ago, it came as a surprise to find in your March issue a statement that Jupiter had nine, instead of 11, satellites.

JOHN STERING

Deerfield, Ill.

The copy desk is surprised, too—at itself. Seth Nicholson discovered Jupiter's 10th and 11th satellites in 1938.

Praise from Down Under

Sir:

I wish to congratulate you on the recent very great improvement introduced into Popular Science by the elimination of this "turn to page xxx" business. Probably few have written to you about it, but I believe I am speaking for thousands of silent readers in regarding this as a finishing touch to a superb magazine.

A. E. CHARLTON

West Tamar, Tasmania

Copyrighted material

ADVICE *for the* INVENTOR

The U. S. Patent Office advises the inventor, unless he is familiar with such matters, to employ a competent, registered patent attorney since the value of a patent depends largely upon the skillful preparation of the specifications and claims set forth in his application.

PRELIMINARY STEPS *toward* PATENT PROTECTION

The Evidence of Invention form mentioned below is offered as a convenience to the inventor in making his disclosure of invention. The inventor should date and sign his disclosure and have it witnessed by two or more persons who are capable of understanding his invention. The disclosure should then be mailed together with the inventor's authorization to conduct a preliminary search at the U. S. Patent Office among previously granted U. S. Patents for similar types of invention. A report is then prepared on the probable patentability of his invention and a recommendation made as to the further course he should take in regard to his invention, provided that the patentability report indicates possible patentability.

VICTOR J. EVANS & CO., has a staff of experienced, registered patent attorneys available to represent inventors in the preparation and prosecution of their cases before the Patent Office. The coupon below is suggested as a convenience to the inventor in starting action on his invention.

VICTOR J. EVANS & Co.

Merlin M. Evans

REGISTERED PATENT ATTORNEY

240-G Merlin Building, Washington 6, D. C.

PLEASE SEND DETAILED PATENT INFORMATION TOGETHER WITH CONVENIENT "EVIDENCE OF INVENTION" FORM.

Name.....

Address.....

City and State.....

PATENTS • TRADEMARKS • COPYRIGHTS

Copyrighted material

It's YOUR future—Make the most of it!

Start now to earn the bigger pay in electrical repair

WAS there ever such an opportunity to get started in electrical maintenance and repair—and at top-notch wages? Are you ready—with experience and ability—to cash in on it? Others are getting just the sort of background needed—quick! practical!—to handle the great variety of electrical maintenance and repair work TODAY—from this well-known electrical library. You can too!

THE LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR

5 vols., 1826 pages, 1724 illustrations

Gives you the "know-how" to tackle any wiring or motor job. Five books show you HOW—to install all types of motor and generator units—to inspect and repair motor starters and generators—to diagnose motor and generator troubles—to figure new windings for old cores—DC and AC windings—to test armature windings—test induction motors, etc., etc. One book is full of trouble-shooting charts that show quickly symptoms, causes, specific remedies, etc.

Take the first step toward improving YOUR future—Mail this coupon TODAY

No money down—special price—easy payments—FREE trial

McGraw-Hill Book Co., 330 W 42 St., New York 18, N. Y.

Send me for ten days' free examination the Electrical Maintenance and Repair Library. If satisfactory I will send you $1.50 in 10 days and $3.00 monthly until the price of $16.50 is paid. If not wanted I will return books postpaid. (To insure prompt shipment write plainly and fill in all lines.)

Name.....

Home Address.....

City and State.....

Company.....

Position..... PSM-6-47

Learn to Repair ELECTRIC APPLIANCES

AT HOME in your SPARE TIME

Prepare now for a permanent future, independence and security with a business of your own. Our practical, easy-to-learn home course teaches you, during your spare time, how to repair washing machines, vacuum cleaners, electric ranges, lamps, motors, irons, etc., and do house wiring.

OPEN YOUR OWN SHOP

Have a Secure Future

For the man who is handy with tools, and likes to work with his hands as well as his head, there is a WIDE OPEN OPPORTUNITY today, in this great growing field. If you own your own shop you can depend on making more money in good times . . . and not losing your job in a depression. You can start a business of your own in your garage or basement with $20.00 worth of tools. One good repair job can pay for the cost of the entire course. Write today for further information, without obligation.

WRITE TODAY for FREE BOOK

PACIFIC TRAINING SCHOOL

7217 So. Broadway, Dept. S-106, Los Angeles 3, Calif.

Dear Sirs: Please send me, without obligation, your free catalog and free details.

Name .....

Address .....

City..... *State*.....

STUDY AT HOME

With An Educational Institution

Men with specialized training win higher positions, insure larger earnings, and are bigger successes in business and public life. Opportunities NOW greater than ever before. Send for our Catalog.

ARTS and SCIENCES

Courses in Philosophy; Education; Letters; Public Health; Medical Jurisprudence; Psychology; Sociology; Physics; Chemistry; Plastics; Geology; Political Science; Theology; Business and Commerce; Accounting; Mathematics; Statistics; Agriculture.

ENGINEERING

Courses in Electrical, Civil, Mechanical, Drafting, Architectural, Steam, Aeronautical, Radio, Structural, Mining, Industrial, Petroleum, Marine, Chemical, Diesel, Automobile, Refrigeration, and Air Conditioning Engineering.

LAW

Complete Professional Law Course includes 18 Hornbrook Series college grade textbooks. Courses also in Commercial Law, Patent Law and Medical Jurisprudence.

McKinley-Roosevelt Incorporated, 4610-AB, Sheridan Rd., Chicago 40, Ill.

"How to Make Money With Simple Cartoons"

A book everyone who likes to draw should have. It is free; no obligations. Simply address

CARTOONISTS' EXCHANGE

Dept. 1446-D **Pleasant Hill, Ohio**

ELECTRICIANS' SCHOOL

PRACTICAL RESIDENT TRAINING IN

HOUSE AND COMMERCIAL WIRING • MOTOR REPAIR AND REWINDING • ELECTRIC REFRIGERATION, COMMERCIAL AND DOMESTIC.

Approved for Veterans Training

PENNSYLVANIA INSTITUTE SCHOOL OF ELECTRICITY

42nd and SPRUCE STS. **PHILADELPHIA 4, PENNA.**

THIS CAN BE YOU IN A FEW MONTHS! BIG MONEY *in Your Own*

APPLIANCE REPAIR BUSINESS

Do actual work daily in school shop under qualified instructors. Train to repair all makes of electric appliances. Learn fundamental electricity—motor winding, etc. **REFRIGERATION**—goes hand in hand with appliance repair. Learn to install—service—maintain all makes home, store and factory refrigeration units. **VETERANS**—CASH-IN on your G. I. rights. Get $65.00 to $90.00 per month while learning. Write for free illustrated folder today.

WE SHOW YOU HOW

MICHIGAN SCHOOL OF TRADES Inc.

31 Melbourne Dept. S-5 • Detroit 2, Michigan

How to Use Mathematics in Your Work

HANDBOOK OF APPLIED MATHEMATICS

by MARTIN E. JANSSON

Designed like an engineering manual, this great second edition of Applied Mathematics contains all practical methods of solving the problems that arise in trades and businesses. Thousands of worked-out sample problems enable you to calculate material requirements for any job—excavations, foundations, concrete, brickwork, sheet-metal work, electricity, radio, carpentry, painting, paper hanging, glazing, plumbing, heating, etc. It shows you how to obtain mathematical facts, simply and easily by means of handy, quick-reference tables. More than 900 pages, illustrated..... **$6.00**

D. Van Nostrand Company, Inc. **Examine this great book FREE**
250 Fourth Avenue, New York 3, N. Y.

Please send me a copy of "Handbook of Applied Mathematics." Within 10 days I will either return the book or send you $6.00 plus a few cents postage.

Name.....

Address.....

City..... State.....

Pop. Sci.—June 1947

Copyrighted material

LEARN EITHER Electricity OR Radio IN A FEW WEEKS in the GREAT SHOPS of COYNE

NOT "Home Study" Courses ...All Practical Training and Necessary Theory Given in Our Famous Chicago Shops!

Why spend years learning Electricity or Radio, when COYNE prepares you for good jobs in either field in a few short weeks? Our training not only saves time; you're ready to step into the better pay that much sooner. You make rapid progress because you work under expert instructors here in our great shops. We do not teach by mail. Select course you prefer and send coupon TODAY!

ELECTRICITY

Including Industrial Electronics

Big future in Power Plant Work, Motors, Armature Winding, House and Factory Wiring, Industrial Electronics, Home Appliances, Lighting, Auto Electricity, Electrical Maintenance — all covered at COYNE. Here you get "all-around" Electrical training!

TRAIN ON REAL EQUIPMENT

You use, test, repair full-size apparatus — just like you'll later handle on the job. Previous experience unnecessary.

FREE ELECTRICAL BOOK

Send now for big, illustrated book on COYNE Electrical Training. Many large pictures of our shops. Tells about Free Lifetime Employment Service to **Coyne** graduates. Other vital facts. Check coupon for "ELECTRICITY" and mail today.

RADIO including SOUND and TELEVISION

If you prefer Radio, COYNE gives quick, practical training in Radio Construction, Testing, Repair; also Public Address, Sound Systems, FM, Television. Many branches of Radio open to you.

Want to be Your Own Boss?

Hundreds of **Coyne** graduates have successful Radio shops of their own. We show you how to start, how to build for a lifetime future. No previous experience required to take **Coyne** Radio Course.

FREE RADIO BOOK

Check coupon for "RADIO" to receive our big FREE book of photos and facts about **Coyne** Training in Radio, Sound and Television. Describes the vast new opportunities in this field, and how we make it easy to get ahead. Rush coupon NOW

COYNE HAS BEEN TRAINING MEN SINCE 1899

B. W. COOKE

For nearly 50 years, the great shops of COYNE have been turning out men and young men trained for better jobs in practical fields. **Coyne** graduates hold responsible positions in many leading electrical and radio firms.

NON-VETERANS who are short of cash can finance their tuition and pay it in easy monthly payments after graduation.

VETERANS! Coyne is authorized to accept veterans for G. I. training. Coupon brings bulletin.

ADDED TRAINING in ELECTRIC REFRIGERATION included with either course

CHECK COUPON FOR ELECTRICITY OR RADIO—MAIL NOW!

B. W. COOKE, Director,
COYNE ELECTRICAL SCHOOL,
500 S. Paulina St., Dept. A7-73H Chicago 12.

Send me your BIG FREE BOOK—for the **Course checked** below, and tell me about your special plans to help me. This does not obligate me and no salesman will call.

☐ ELECTRICITY ☐ RADIO

NAME.....

ADDRESS.....

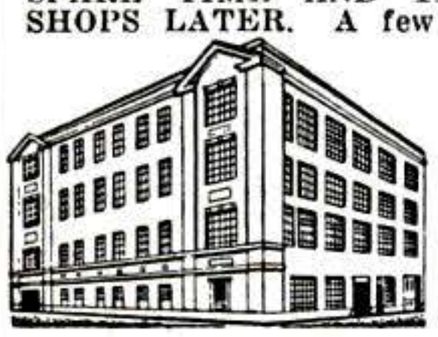
CITY.....STATE.....

COYNE ELECTRICAL SCHOOL
Dept. A7-73H,
500 S. Paulina Street, Chicago 12, Ill.

Copyrighted material

Make Your Decision for a BETTER JOB OR A BUSINESS OF YOUR OWN

AIM high—pick one of these big fields. May never again be such opportunities to get in on ground floor and go up fast. REFRIGERATION & AIR CONDITIONING growing fast—frozen foods, commercial installations, many other developments. ELECTRICITY & INDUSTRIAL ELECTRONICS offers good pay to trained men. BODY & FENDER REBUILDING bringing many big money. AUTO MECHANICS in demand. DIESEL a rapidly expanding field. Pick one of these fields now—for men who ACT FAST things can happen fast. CONSULTATION AND PLACEMENT SERVICE whether you are interested in worthwhile job or setting up your own business. YOU CAN START TRAINING AT HOME IN SPARE TIME AND THEN COME TO BIG TRAINING SHOPS LATER. A few short weeks can make all the difference. VETERANS ENROLLED UNDER "G. I." BILL. COMMERCIAL TRADES INSTITUTE, a nationally known school, only civilian school selected by Army to train service men for refrigeration. FACTS FREE. MAIL COUPON TODAY. NO OBLIGATION.



Fill Out, Cut Out, Mail Today

COMMERCIAL TRADES INSTITUTE, Dept. E16
1400 W. Greenleaf, Chicago 26, Ill.

Send FREE illustrated Brochures and other information about the field I have checked below.

☐ Refrigeration and Air Conditioning ☐ Auto Mechanics
☐ Electricity & Industrial Electronics ☐ Diesel
☐ Body & Fender Rebuilding

Name.....

Address.....

City.....State.....

☐ Veteran ☐ Non-Veteran

Do you want

..to go to College?

..or to enter a Profession?

(Such as Accounting, Architecture, Nursing, Dentistry, Teaching, Social Work, Osteopathy, Beauty Culture, Optometry, Embalming, Chiropody, Law, Medicine, etc.)

..or get an Office Position?

To get anywhere, you practically MUST finish High School FIRST. You can complete our simplified High School Course in SPARE time at home, as FAST as your time and abilities permit. Equivalent to resident school work—prepares you for college, pre-professional examinations, business, industry. Standard texts furnished. Diploma. Credit for H.S. subjects already completed. Single subjects if desired. Low tuition, easy terms. American School, Chicago, est. 1897—endorsed by educators. Finish your high school education NOW. Write TODAY!

High School Course at Home

Many Finish in 2 Years

American School, Dept. HA46, Drexel Ave. at 58th St., Chicago 37

Gentlemen: Send me FREE information covering special training in subjects checked below. No obligation on my part.

☐ High School Course
☐ Electronics, Industrial
☐ Architecture and Building
☐ Automotive Engineering
☐ Business Management
☐ Electrical Engineering
☐ Elec. and Gas Refrigeration
☐ Air Conditioning
☐ Railway Training
☐ Diesel Engineering
☐ Drafting and Design for Men and Women
☐ Plastics
☐ Private Secretary
☐ Mechanical Engineering
☐ Aviation
☐ Salesmanship
☐ Radio

Name.....

Address.....

Get into Good Paying AUTO BODY and FENDER WORK

BIG DEMAND in Auto Body and Fender work. Start training now in your spare time at home for good pay work. Practical shop experience included. U.E.I. Training covers metal work, welding, painting, etc. Placement service—or we will show you how to start your own shop. Behind U.E.I. TRAINING is a large national organization founded 1927. Write today for FREE FACTS—No obligation.

Approved for Training under G.I. Bill

AUTO-CRAFTS DIVISION • UTILITIES ENGINEERING INSTITUTE
1314 BELDEN AVENUE, DEPT. 367-X, CHICAGO 14, ILLINOIS

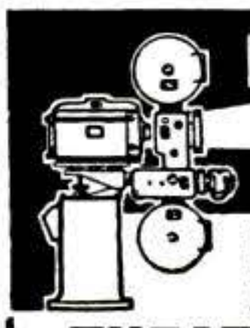
Learn to MOUNT BIRDS

Tan SKINS, Make Up FURS

Be a Taxidermist. We teach you **at Home.** Mount **Birds, Animals, Pets,** common specimens. Save your hunting trophies; decorate home and den. Make genuine **KROME LEATHER,** tan and make up furs for sparetime profit.

FREE BOOK 48 pages—tells all about it. Hunters, get this wonderful book. Its **Now Free.** Send postal card **Today—This Minute!** State your **AGE.**

N. W. School of Taxidermy, Dept. 339A Omaha, Nebr.



LEARN MOVIE PROJECTION

THEATRE MANAGEMENT

The Motion Picture Theatre Business offers big opportunities for trained men. Get into a fascinating field with a promising future. Train at home in spare time. Free Catalog. Established 20 years.

THEATRE INSTITUTE 385 Washington St., Elmira, New York

AMAZING DISCOVERY! Corrects poor penmanship in few days—big improvement in three hours, no failures. Complete Outline Free. Write, C. Ozment, 35-B, St. Louis, Mo. IMMEDIATELY.

Learn MECHANICAL DENTISTRY

A profession offering unlimited opportunities. Most modern and complete course embracing every branch from Plate to Porcelain Work, which prepares you to work for Dentists or start your own business. Individual instruction—practical training in day or night school. No books—no classes. Catalog upon request.

McCARRIE SCHOOL OF MECHANICAL DENTISTRY
207 N. Broad St. Dept. 863 Philadelphia, Pa.

NOW

CHANITE SELF-WELDING FLUX—REPAIRS all ELECTRIC HEATING ELEMENTS. So simple anyone can make repairs in your broken or burnt-out electrical appliances—irons, toasters, stoves & etc. Guaranteed nothing like it. From our mines to your appliances. **$1.00** per package. **$7.50** per doz. Stick form **25c. $2.00** per doz.

CHANITE SALES COMPANY, 914 South Main, Fort Worth 4, Texas

LIQUID MARBLE COLORED POTTERY

Different! Marvelous! Color-glazed. Brush, spray, mold tiles, table-tops, ornaments! **SANITARY COMPOSITION FLOORING**—Dustless, noiseless; put on like plaster, plain or tile designs; yielding as cork, lasting as stone. **RUBBERLASTIC Mold Compound**—For plaster casting, novelties, statuary, toys, plaques, dolls. **TILEX Colored Roofing.** Build Modern **PLASTIC HOMES.** Illustrated literature free.

RAPID MARBLEIZING SERVICE, Dept. 12-A, Edwardsville, Illinois

GOLD TEETH WANTED

Dental gold teeth, plates and bridges with metal attached. Any broken pieces of gold jewelry. Immediate payment and free mailing container to you or your friends upon request.

LOWES, DEPT. PS, Holland Bldg., St. Louis 1, Mo.

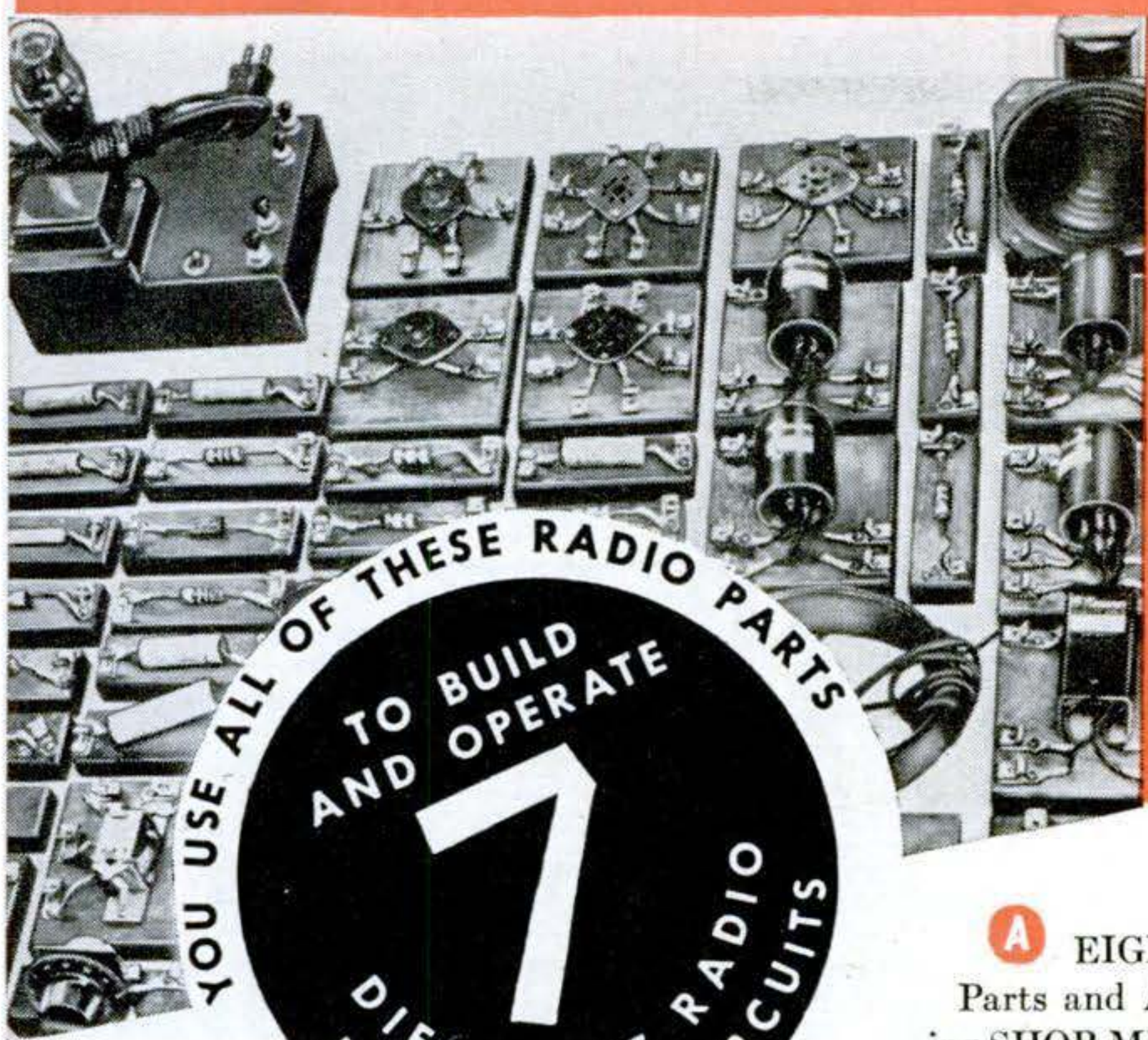
SIGNS AND SHOWCARDS EASILY AND EXPERTLY PAINTED WITH LETTER PATTERNS

MANY SIZES & STYLES, WRITE FOR FOLDER!

JOHN F. RAHN
1330-33 N. CENTRAL AVE.
CHICAGO 51, ILL.

Copyrighted material

Now IN YOUR OWN HOME *Learn* RADIO ELECTRONICS *The Practical* "HOME-TESTED" *Modern* "A-B-C" *Way*



YOU USE ALL OF THESE RADIO PARTS TO BUILD AND OPERATE **7** DIFFERENT RADIO RECEIVING CIRCUITS

INCLUDING:

1. Simple Receiver
2. Two Tube Receiver
3. Tuned Radio-Frequency Receiver
4. Short Wave Receiver
5. Aviation Band Receiver
6. 4-Tube Superheterodyne
7. 5-Tube Superheterodyne with Magic Tuning Eye

• • • PLUS SCORES OF OTHER FASCINATING, INSTRUCTIVE RADIO-ELECTRONIC EXPERIMENTS

WITH THE HELP OF

A EIGHT Big Kits of Actual "Learn-by-Doing" Radio Parts and Assemblies with which you make 133 fascinating SHOP METHOD EXPERIMENTS in your own home! Imagine building 7 different Radio Receivers that operate!

B A 16 mm Home Movie Projector and Twelve Reels of "Learn-by-Seeing" Home Movie Films . . . for picture-clear, fast understanding of Radio Fundamentals!

C Modern, well-illustrated, Loose-leaf Lessons, prepared in clear, simple, understandable language . . . to guide you throughout your training!

THEN GET THE HELP OF OUR EFFECTIVE EMPLOYMENT SERVICE

NO PREVIOUS RADIO OR ELECTRICAL EXPERIENCE NECESSARY

DeForest's Training, Inc. provides *every major home study aid* to help you learn Radio-Electronics rapidly and thoroughly . . . to give you the *experience* and *confidence* needed for a responsible, Good-Pay Job, or to Start a Business of Your Own! Here is a REAL opportunity field for YOU . . . *when you are a trained Radio-Electronics man!* Just think of the tremendously exciting future ahead of FM Radio, Aviation and Broadcast Radio, Sound Motion Picture Equipment, Servicing and Sales of Radio Equipment, etc. Put *yourself* in this picture . . . See how *you* can benefit from a PRACTICAL training in this fascinating work! Think, too, of the coming possibilities ahead of Radar, Facsimile and Television. Send TODAY for the interesting, opportunity-revealing book, "Victory for You!" See how others probably no more talented or ambitious than you, have advanced in earning power after this training . . . how YOU can do it too! Mail the coupon NOW!

VETERANS!

Big things are happening at DeForest's Training, Inc. for **veterans!** See how you can prepare yourself WITHOUT COST for a GOOD JOB or a BUSINESS OF YOUR OWN in the vast Radio-Electronic opportunity field.

YOU USE "LEARN-BY-SEEING" MOVIES

16 MM MOVIE PROJECTOR

DEFOREST'S TRAINING, INC. INCLUDES INSTRUCTION IN MOTION PICTURE SOUND EQUIPMENT, FM RADIO AND TELEVISION . . . RESIDENTIAL TRAINING IN OUR MODERN CHICAGO LABORATORIES ALSO AVAILABLE—ASK US FOR INFORMATION!

DeFOREST'S TRAINING, INC.
CHICAGO 14, ILLINOIS

E. B. DEVRY, President
DeFOREST'S TRAINING, INC.
2535-41 North Ashland Ave., Dept. PS-D6
Chicago 14, Illinois, U.S.A.

Send FREE "VICTORY FOR YOU!" BOOK, showing how I may make my start in Radio Electronics.

Name_____ Age_____

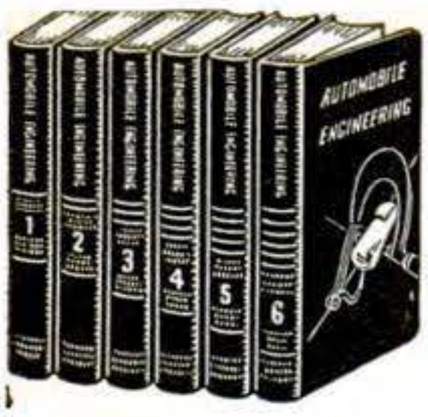
Address_____ Apt._____

City_____ Zone_____ State_____

☐ If under 16, check here for special information.

☐ If a discharged Veteran of World War II, check here.

Copyrighted material



AUTO BOOKS ON APPROVAL

CAN YOU FIX IT?

These wonder books tell step by step HOW to make difficult repairs and adjustments, how to keep a car at maximum efficiency, including latest improvements in car design and operation. Engine troubles and how to correct them well covered.

6 BIG VOLUMES

2800 pages, 2000 illustrations, wiring diagrams, etc., including Diesel engines. Beautiful modernistic, washable cloth binding.

SEND NO MONEY. Just mail the coupon for a complete set of Six Big Auto Books. 20th Edition. Whether you are a mechanic or helper, expert or apprentice, auto owner or driver, take immediate advantage of this FREE EXAMINATION OFFER.

MAKE GOOD MONEY NOW HOLD A PERMANENT JOB

America wants its automobiles kept in good repair. Men with "know how" are in demand, at big pay. These books will help you get and hold an important job, or give you a chance to go into business for yourself now or later. Any man who half tries to improve himself can learn auto servicing and repairing by this quick reference method. Use the JIFFY INDEX to find easily understood answer to any auto problem. These wonder books prepared by eleven of America's great automobile engineers. Many hundreds of valuable illustrations. Send the coupon TODAY.

[A year's consulting privileges with our engineers now given with these books without extra charge.]

Vocational Publishers Since 1898

AMERICAN TECHNICAL SOCIETY, Dept. AA20, Drexel Ave. at 58th St., Chicago 37, Ill.

I would like to examine your Six-Volume Set of Auto Books. I will pay the delivery charges only, but if I choose I may return them express collect. If after 10 days' use I prefer to keep them, I will send you $2 and pay the balance at the rate of only $3 a month until $24.80 has been paid. Please include consulting service as offered above.

Name.....

Address.....

City.....State.....

Please attach letter stating age, occupation, employer's name and address, and name and address of at least one business man as reference. Men in service, also please give home address.

✓ Check these CAREERS IN PLASTICS

✓ Plastics Technology • Plant and Mould Design
Laminated Wood • Natural and Synthetic Rubber
• Plastic Paints, Varnish and Lacquers

This new industry offers exceptional opportunities to thoroughly trained men. Expert tuition is now available. These comprehensive home study courses cover every aspect of this fascinating industry. Our free 118-page handbook "ENGINEERING OPPORTUNITIES", also lists courses in Mining, Automobile, Electrical, Mechanical, Civil, Aeronautical, and other well-paid occupations.

Write today without obligation to: Canadian Institute of Science & Technology, 411 Century Building, 412, 5th St., N.W., Washington, D.C.

Canadian Institute of Science & Technology, 411 Century Bldg., 412, 5th St., N.W., Washington, D.C.
Please send me without obligation of any kind, details of your courses in Plastics.

Name.....Age.....

Address.....

Canadian Address — 219 Bay Street, Toronto

ANALYZE HANDWRITING

Qualify for Certified Grapho Analyst Degree at home, spare time. Credit, Employment, Personnel Managers, Business, Professional men, women **use grapho-analysis in their work, earn substantial fees in spare time.** Many study solely for personal benefit, no desire to earn money, **find it so fascinating they start using it to add to their incomes.** Entertainment field pays well, up to $100 in a week reported. Others establishing profitable practices as Vocational and Family Problem Counselors, Personality Teachers, and lecturers.

GROWING—UNCROWDED PROFESSION

More and more police use grapho analysis handling suspects and criminals. They understand how criminals think. Their handwriting tells. Men like Hugh Dunlap, university student, Harry Allen, retired preacher, use it in court, win cases, earn fees even before graduation. **Only school in world devoted to teaching grapho analysis** offers thorough training to earnest, ambitious men and women regardless of where you live, small town, farm or city. Send for GRAPHO ANALYST, illustrated lesson, personal handwriting analysis offer, ALL FREE. Must be 21 or over. Address **A. I. G. A. Inc., 126, Noel, Missouri.**

"YOU ARE UNDER ARREST!"

Help Bring Crooks to Justice Through Scientific

CRIME DETECTION!

I have taught thousands this exciting, profitable, pleasant profession. Let me teach you **in your own home.** Learn Finger Printing, Firearms Identification, Police Photography, Secret Service Methods thoroughly, quickly, at small cost. 53% of all American Bureaus of Identification employ I. A. S. students or graduates. I can prepare you for this fascinating work, during spare time. Write today, **stating age,** for "Blue Book of Crime."

INSTITUTE OF APPLIED SCIENCE, 1920 Sunnyside Ave., Dept. 136-A, Chicago 40, Ill.

SHORTHAND in 6 Weeks at Home

Famous Speedwriting system. No signs or symbols; uses ABC's. Easy to learn; easy to write and transcribe. **Fast preparation for a job. Surprisingly low cost. 100,000 taught by** mail. Used in leading offices and Civil Service. Also typing. Write for free booklet. **Speedwriting, Dept. 2606-7, 55 W. 42 St., N.Y. 18, N.Y.**

THERE'S MONEY IN CARTOONS!

RAYE BURNS will teach you HOW to CREATE ORIGINAL CARTOONS **at home** that you may SELL! Course contains **26 lessons and over 600 illustrations. All for *Only* . .** **$2.85**

Send name and address for free details.

RAYE BURNS SCHOOL, Dept. S, Box 3583, CLEVELAND, OHIO

SUIT YOURS AS A BONUS

And Big Money in Spare Time, Too

We want you to wear this fine made-to-measure suit! Make it yours by sending a few orders, and earn BIG CASH PROFITS in spare time. Your suit will help you get more orders with scores of rich, quality fabrics, tailored-to-measure to newest styles. Also Ladies' Tailored Suits—complete line. Write today for FREE SAMPLES. No experience, no money needed. For quick action tell us about yourself.

J. C. FIELD & SON, Inc.
Harrison and Throop Sts., Dept. T-1720, Chicago 7, Ill.

Say You Saw It In Popular Science

RHEUMATISM

ARTHRITIS-NEURITIS-SCIATICA

If you suffer the agonizing pains of these diseases when the usual remedies have failed, learn about a new trustworthy, modern, non-surgical treatment method. This marvelous treatment is completely explained in the Ball Clinic's FREE Book. Write today. No obligation.

BALL CLINIC Dept. 36 Excelsior Springs, Mo.

Copyrighted material

GET INTO RADIO TELEVISION ELECTRONICS NOW!

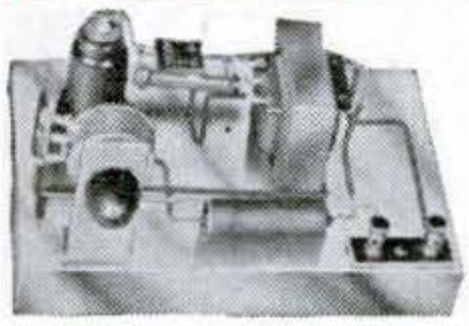
This practical shop instruction system gives you actual experience with a Home Radio Laboratory — part of the

You build this complete, modern superheterodyne receiver with the equipment that comes with your National Training at no cost.

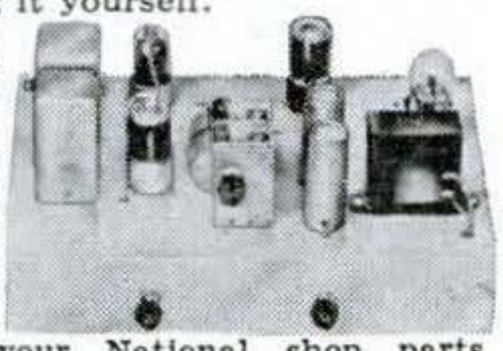
SHOP METHOD HOME TRAINING

from one of the world's Oldest and Largest Technical Trade Schools

FOR YOU—A REAL HOME LABORATORY IN MODERN RADIO



Your National Training Kits include equipment for over a hundred practical electronic experiments in your own home. You get standard radio parts for this audio oscillator which you get to understand by building it yourself.



You learn modulation, beat frequencies, signal generation by actually building this small radio transmitter with your National shop parts. Your training outfits from National are made up of the most modern radio equipment — much of it just out of the experimental laboratory. You learn new ways of handling equipment by modern methods. Get the details by mailing the coupon.

Send the coupon below immediately. Learn how this improved practical training can fit you for the GREAT BUSINESS OF RADIO—for the NEW AND RAPIDLY EXPANDING FIELD OF FREQUENCY MODULATION (F.M.), TELEVISION AND ELECTRONICS.

This is the thoroughly proved method used so extensively in wartime training—endorsed by **the success of National men everywhere**—a system by which you study in spare time—off hours, even minutes right in your home and yet have the ADVANTAGE OF REAL SHOP EXPERIENCE behind you.

Trained Radio Men Wanted

The man who really **knows modern Radio** is in greater demand today than ever before—not only in Radio proper but in Television and Electronics—in Aviation, Transportation, Manufacturing, Communications. Good jobs await the trained man, in the production, operation and maintenance of modern electronic equipment—in radio stations, in hundreds of industries—in homes, theatres and studios. Good sound training in this important field is absolutely necessary. And now, National Schools brings such training to you **no matter where you live or what you may be doing**—not only the fundamental theory but **the actual experience that comes with knowing shop practice and working with real equipment**—demonstrating each step with first-hand knowledge. This is true **"learning by doing"**—direct from the great shops and laboratories of National Schools where new developments in methods, equipment and applications are constantly going forward.

National offers you such practical training and National has the facilities. **Sample this training** yourself. MAIL THE COUPON FOR A FREE LESSON.

SUCCESS *and* SECURITY FOR YOU

Radio is a Well-Established Business. Television and allied fields are just on the threshold of limitless expansion. Would you like to profit from these developments? An excellent job or perhaps into a business of your own? Answer these questions by reading the catalog sent you FREE from National Schools. Get the facts.

Check the Job You Now Have With These Opportunities in RADIO

1. **Financial Security** Radio has grown from $100 million to $5 billion in past few years.
2. **Limitless Future** predicted by over 1,800 manufacturers of equipment.
3. **Television promises** unrealized opportunity.
4. **Electronics opens** wide new fields in home and industrial use.
5. **Your Own Business** with little capital.

Get the details. Use the coupon!

FREE GET THESE 2 BIG BOOKS

NATIONAL TRAINING WINS BIG JOBS

You, too, can share the success of National graduates, Clifford Hannah, Portage La Prairie, Manitoba, Canada, writes: "My training has brought results as I'm in line for another raise, thanks to National's encouragement and thorough training. You can count on me as a real National booster and I am glad I used such good judgment in getting into a live and growing field."

While still a student of National training, I, Wilson of Vallejo, California, writes: "My pay has jumped from $52.18 a week to $72.65, and the end is not in sight. I am proud of my National Course."

VETERANS

If you qualify for training under G.I. Bill, check the coupon for a Special Bulletin.

NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST. 1905

MAIL OPPORTUNITY COUPON FOR QUICK ACTION

National Schools, Dept. 6-PS
4000 South Figueroa Street
Los Angeles 37, California

(Mail in envelope or paste on penny postcard.)

Mail me FREE the books mentioned in your ad including a sample lesson of your course. I understand no salesman will call on me.

NAME..... AGE.....

ADDRESS.....

CITY..... ZONE.... STATE.....

☐ **Check here if veteran of World War II**

Copyrighted material

SURPLUS BARGAINS

ASSEMBLE YOUR OWN BINOCULARS!

Complete Optics! Complete Metal Parts!
Save More Than ½ Regular Cost

ARMY'S 7x50 BINOCULARS

Here's an unusual opportunity to secure a fine set of Binoculars at a substantial saving of money. Offered here are complete sets of Optics and Metal Parts for the Army's M-16 7 x 50 Binoculars. These components are new and all ready for assembly. We supply full instructions.

METAL PARTS — Set includes all Metal Parts — completely finished—for assembly of 7 x 50 Binoculars. No machining required. Bodies have been factory hinged and covered. A sturdy Binocular Carrying Case is included with each set of Metal Parts.

Stock #824-N...7 x 50 Metal Parts.....**$35.00 Postpaid**

OPTICS—Set includes all Lenses and Prisms you need for assembling 7 x 50 Binoculars. These Optics are in excellent condition—perfect or near perfect—and have new low reflection coating.

Stock #5102-N...7 x 50 Optics.....**$25.00 Postpaid**

NOTICE! Add 20% Federal Excise Tax to above prices if you order both Binocular Optics and Metal Parts.

NEVER HAS THERE BEEN SUCH A SENSATIONAL BARGAIN AS THIS!

BUBBLE SEXTANT—Type A-10, used by Army Air Forces. These have just arrived and will be priced so low you'll think we have made a mistake. Send at once for complete descriptive Bulletin 16-N containing pictures, facts and price. If interested, don't wait, because this bargain won't last long.

We have literally millions of war surplus lenses and prisms for sale at bargain prices. Write for Catalog "N"—Sent Free!

Satisfaction Guaranteed • Order by Stock No.

EDMUND SALVAGE COMPANY
P. O. AUDUBON NEW JERSEY

ELECTRICIANS

Get this Great Book FREE

Book of 150 Shop Prints, Wiring Diagrams, Full Size 8½" x 11"

For Merely Examining Coyne's NEW Pay Raising

7 Volume Set APPLIED ELECTRICITY

Here's a *brand new* set of electrical books to give you the "know how" on all branches of electricity from appliance repairing to D. C. and A. C. equipment, electrical refrigeration, etc. 3,000 subjects, 10,000 facts, latest methods all explained in easy to follow instructions. In order to prove how valuable and **Practical** this set of electrical books is **I'm willing to give you a FREE copy** of my book "150 Shop Prints and How to Read Them" **just for looking over this set.** Written by the Coyne Technical Staff and backed by 47 years' experience, this set has helped many ambitious electrical workers to **bigger pay, better jobs & added opportunity.**

OFFER LIMITED • ACT NOW! Here's my offer to you — if you act promptly. I'll send you the 7 volume set **Applied Practical Electricity** for 7 days **FREE** examination . . . together with the 150 Shop Print Book. Look the set over 7 days. If you like it send either $19.75 cash or send $3.00 after 7 days and $3.00 per month until $21 is paid. If you don't want the set, return it and YOU OWE NOTHING. **In either event, however, you keep the 150 Shop Print Book absolutely FREE.**

SEND NO MONEY! Coupon below is just a request to see the books free and to get my gift book for doing it. ACT—Send coupon Today!
Technical Book Div., COYNE ELECTRICAL SCHOOL, 500 S. Paulina Street, Dept. A7-R8, Chicago 12, Ill.

FREE BOOK Coupon

B. W. Cooke
Director

COYNE ELECTRICAL SCHOOL, Dept. A7-R8,
500 SOUTH PAULINA STREET, CHICAGO 12, ILLINOIS

Send me that 7 volume set APPLIED PRACTICAL ELECTRICITY and your **FREE gift of a copy of "150 Shop Prints and How to Read Them". I'll either return the set in 7 days and owe nothing or send you either $3 in 7 days and $3 a month until $21 is paid or $19.75 cash. Regardless of whether or not I keep the 7 Volume Set the 150 Shop Prints is mine FREE as a Gift.**

NAME _____ AGE _____

ADDRESS _____

TOWN _____ ZONE _____ STATE _____

LEARN PIANO WITH RECORDS

IN ONLY 10 EASY LESSONS

FIRST LESSON STARTS YOU PLAYING SONGS
LOW COST! NO RISK! SEND NO MONEY! Amazing . . . so easy . . . so practical. Here is the world's only piano course using this modern perfected method.
HEAR YOUR TEACHER'S VOICE ALWAYS BESIDE YOU . . . GUIDING YOU. You learn faster . . . easier . . . through exclusive teaching records never before available. First lesson starts you playing actual pieces with both hands. Stop Wishing. Start Playing. For complete information Kit FREE, Send your Name and Address to
TRACY INSTITUTE OF MUSIC
Dept. P.S.2 54 Holmehurst Ave. Baltimore 28, Md.

ELECTRICAL TRAINING

Intensive 32 weeks residence course in fundamentals of industrial electrical engineering, including radio, electronics. Prepares for technician, engineering aides. Approved for veteran training. 54th year. Write for catalog.

BLISS ELECTRICAL SCHOOL
7610 Takoma Ave., Wash. 12, D.C.

TRI-STATE COLLEGE

B.S. Degree in 27 months in Engineering (7 branches), Bus. Admin., Acctg. and Sec. Science. **64th year.** School now filled to capacity. No applications can be accepted until further notice. **567 College Ave., Angola, Ind.**

Begin today. Write now for our Free Book, "How to Become a Good Penman," it contains specimens and tells how others learned to write in spare time. Enclose 10c for your name beautifully written and a pen point suitable for shaded writing. Write today.
THE TAMBLYN SCHOOL OF PENMANSHIP
N-439 Ridge Building, Kansas City, Mo.

SHALLOW WATER DIVING UNIT

For salvage, rescue, exploration dives and pool cleaning. Comfortable and efficient; seals absolutely. Low cost with long life. Also, complete line deep-diving gear. Write for details.

- Mask
- Weighted Belt
- Air Hose
- Portable Compressor

DIVING EQUIPMENT & SUPPLY CO.
1121 N. Water Street, Milwaukee 2, Wis.

TALK-SING *thru your own radio* with RADIO MICROPHONE

Be the life of the party. Put on your own broadcasts at home. Talk-Sing, make announcements from any room. Wonderful voice practice. Microphone easily attached to any radio. Follow enclosed instructions. SEND NO MONEY—pay Postman $1.98 plus postage. Send Money Order or check and save postage.

EMPIRE RADIO & TELEVISION CO. (Dept. R1) 1521 Bedford Ave., Brooklyn 16, N. Y.

RAISE CHIN-CHINS

No experience needed. Just a few minutes daily and a few feet of backyard, garage or barn space. Several females and a male starts a large, profitable herd. WE FURNISH FREE INSTRUCTIONS. TREMENDOUS DEMAND for breeding and laboratory stock, meat, and world's most beautiful rabbit fur. Brokers, cut off from imported rabbit pelts by world famine, NEED CHIN-CHIN FURS NOW, and for years to come! Write for free illustrated catalog today.

WILLOW BROOK FARM • R-45 SELLERSVILLE, PENNA.

MAKE THIS SUIT YOURS NEW PLAN

EARN CASH SHOWING TO FRIENDS!

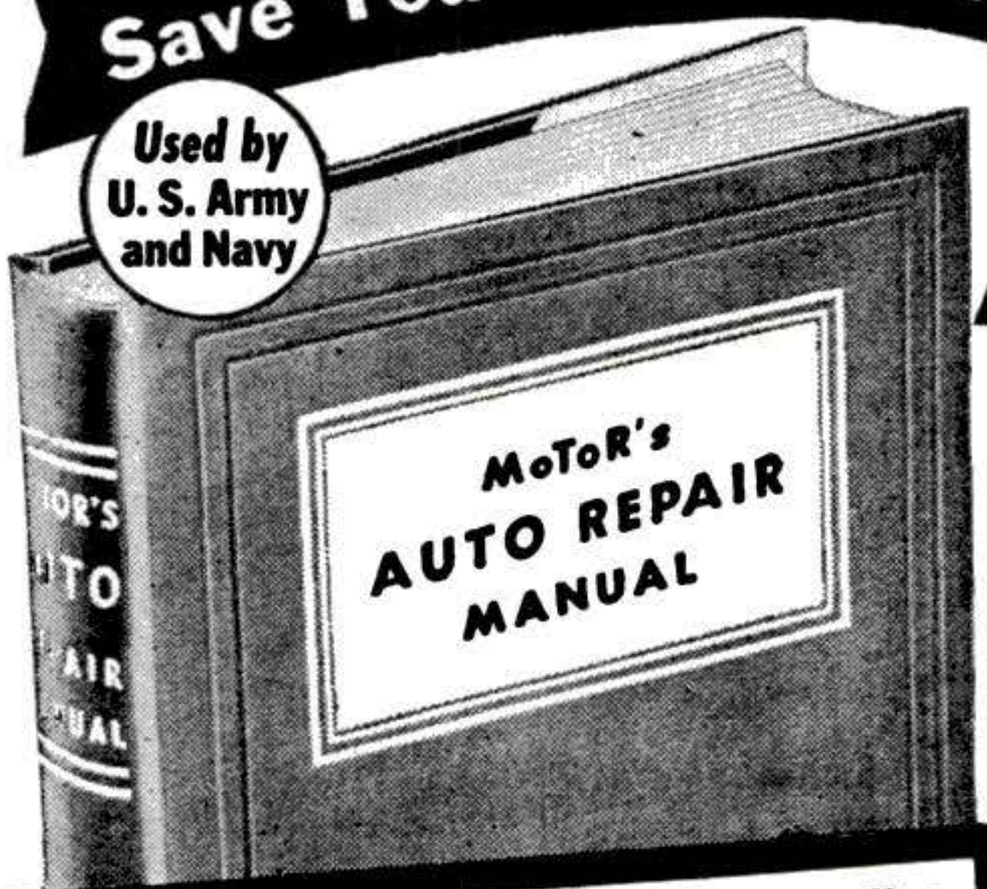
Write at once if you want this fine made-to-measure suit! You can get it by taking a few orders from friends, and earn up to $10, $12 in a day. Your bonus suit helps you take more orders with latest style, made-to-measure **guaranteed** suits at amazingly low prices. Also complete line of Ladies' Tailored Suits. No experience, no money needed. Write TODAY for FREE SAMPLES—telling about yourself—age, etc. No obligation!

PIONEER TAILORING CO. Congress and Throop Streets, Dept. T-1120, Chicago 7, Ill.

Copyrighted material

Now! NO AUTO REPAIR JOB IS TOO TOUGH FOR YOU!

Let this New Short-Cut Save You Time and Work!



Used by U. S. Army and Navy

Whether you do auto repairs either as full-time or as part-time work, no service or repair job can "throw" you when you've got MoToR's AUTO REPAIR MANUAL! Just look up make, model, and the job in the streamlined index—and you're ready to lick ANY job from carburetor to rear end. **Faster, easier, better!**

MoToR's AUTO REPAIR MANUAL Shows You How to Service and Repair ANY Part of ANY Car Built Since 1935!

Nearly 200,000 service and repair facts on all 31 makes. 856 big pages; including 50 pages of carburetor text, charts, illustrations, covering all models. Over 500 charts, tables; Tune-up Chart; Valve Measurements; Compression Pressure; Torque Wrench Reading; Starting Motor; Engine Clearances; Generator; Clutch & Brake Specifications; Front End Measurements, etc., Engines; Electric, Fuel, Cooling, Lubricating Systems; Transmissions; Universals; Front Ends; Wheels; Rear Ends, etc.

Covers All These Makes!

American Bantam	Cord	Lafayette	Oldsmobile
Auburn	Crosley	La Salle	Packard
Austin	De Soto	Lincoln	Pierce Arrow
Buick	Dodge	Lincoln Zephyr	Plymouth
Cadillac	Ford	Mercury	Pontiac
Chevrolet	Graham	Nash	Reo
Chrysler	Hudson	Overland	Studebaker
	Hupmobile		Terraplane
			Willys

Try it FREE for 7 Days!

Try this great book for 7 days FREE! It's "headquarters" for 200,000 facts about service, repair, adjustment, replacement, and tune-up—on every car built from 1935 through 1946. The engineer-editors of MoToR Magazine built this Manual for YOU, by collecting and organizing all the vital information from 150 **official factory shop manuals.** Then they put ALL the facts into this ONE amazing workbook.

More Than 1,000 Pictures!

MoToR's AUTO REPAIR MANUAL not only TELLS you clearly what to do. It SHOWS you, too!—in over 1,000 cut-away photos, diagrams, drawings. 856 BIG pages (8½x11 inches) put the complete "know-how" right at your fingertips! And the fabric binding is strong, built for years of day-in-day-out service!

No wonder it is used by the U. S. Army, Navy, trade and technical schools, thousands of auto servicemen and handymen everywhere! No wonder we're willing to have YOU try it, FREE, for 7 days! Once you use it—and see for yourself how much valuable time and hard work it saves—you'll never again want to be without it!

SEND NO MONEY

7-Day Free Examination

Don't send any cash—unless you wish to do so in order to save postage charges! Simply mail coupon NOW. When postman brings your book, pay him nothing. First make the book **show** you what it does for you! Unless convinced it's the greatest time-saver and work-saver you've ever seen—return book in 7 days, pay nothing. Mail coupon NOW! Address: MoToR Book Dept., Desk 2G, 572 Madison Avenue, New York 22, N. Y.

Same FREE 7-Day Offer Applies on
MoToR's TRUCK REPAIR MANUAL

For mechanics, truck specialists, service stations, fleet owners. Covers EVERY job on EVERY truck made since 1936! 1400 pictures. 952 pages, 300,000 facts. Used by Armed Forces.

All types Gasoline Engines, Diesels, Hesselman. **Fuel Systems, Governors, Lubrication Systems, Ignition Systems, Starters, Generators, Clutches, Transmissions, Axles, Torque Dividers, Transfer Cases, Brakes, Steering,** etc.

ALSO SERVICES many buses, farm and industrial tractors, contractor and road building equipment, stationary power machinery, etc. (on all parts described in Manual.) Check box in coupon at right.

Published by MoToR, The Leading Automotive Business Magazine. MoToR's manuals assure high standards of repair work.

MAIL COUPON NOW FOR 7-DAY FREE TRIAL

MoToR Book Dept., Desk 2G, 572 Madison Ave., New York 22, N. Y.
Rush to me at once: (check box opposite book you want).

☐ **MoToR's AUTO REPAIR MANUAL** If O.K. I will remit $1 in 7 days (plus 35c delivery charge), then $2 monthly for 2 months, and a final payment of 95c one month later. (Book's price $5.95.) Otherwise I will return book postpaid in 7 days. **(Foreign price, remit $8 cash with order).**

☐ **MoToR's TRUCK REPAIR MANUAL.** (Described at left.) If O.K., I will remit $2 in 7 days, and $2 monthly for 3 months, plus 35c delivery charges with final payment ($8.35 in all). Otherwise I will return book postpaid in 7 days. **(Foreign, remit $10 cash with order).**

Print Name _____ Age _____

Print Address _____

City _____ Zone No. (if any) _____

State _____ Occupation _____

☐ **SAVE 35c!** We pay postage if you ENCLOSE full pay't. (check, m.o.). Same 7-day return-refund privilege.

Copyrighted material

NOW! Build Your Future On DIESEL Opportunities

LOOK around you. See the way tractors, trucks, buses, railroads, ships, power plants and equipment of many kinds are "going Diesel." Every day new opportunities are opening—in industrial and farming communities—for trained men who can install, maintain, operate and repair Diesel engines. Plan now to build your future in this growing field.

Diesel Knowledge is Earning Power

You don't have to give up your present job. Now, you can begin learning DIESEL in spare time at home. UEI practical training teaches you, step by step, how Diesel engines operate, how fuel systems work, repairs, accessories and auxiliary equipment; a world of Diesel "know how." Includes actual practice on Diesel equipment in our shop under expert guidance. UEI training methods are successful. For 20 years they have helped mechanically inclined men better themselves.

Send Coupon for FREE FACTS

NOW IT'S UP TO YOU!

Coupon below brings you all the facts without cost or obligation. Get going today! MAIL COUPON NOW.

UTILITIES ENGINEERING INSTITUTE
Diesel Division
1314 W. Belden
Dept. 367-D
Chicago 14, Ill.

Founded 1927

UTILITIES ENGINEERING INSTITUTE, Diesel Division
1314 W. Belden Ave., Dept. 367-D, Chicago 14, Ill.
Please send me Free Facts about Diesel opportunities and training.

NAME _____ Age _____

ADDRESS _____

CITY _____ Zone or County _____ STATE _____

☐ Check here for special information if you are under 17.
☐ Check here if Veteran of World War II.

AVIATION Career

MAXIMUM TRAINING IN MINIMUM TIME

CAL-AERO TECH TRAINING will add dollars to your pay check all the rest of your life. Specializing in AERONAUTICAL ENGINEERING and MASTER AVIATION MECHANICS since 1929, Cal-Aero Tech training is carefully designed for just one thing—TO MAKE MORE MONEY FOR YOU. An alumni of over 6000 successful graduates proves our career training is unsurpassed.

VETERANS —Write us about Aviation Training, as provided under "G.I. Bill of Rights."

CAL-AERO TECHNICAL INSTITUTE
MAJOR C. C. MOSELEY — PRES. SINCE 1929
FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL
GLENDALE 1, CALIFORNIA
LOS ANGELES COUNTY

MAIL THIS COUPON TODAY!

Cal-Aero Technical Institute, Grand Central Airport, Glendale 1, California
Please send full information on Aviation Training FREE—without obligation. Dept PS-5

Name _____ Birth Date _____

Street _____

City _____ State _____

Be A MASTER PLUMBER

Earn $15 To $50 A Day

DON'T ENVY THE PLUMBER—BE ONE

Every skilled workman will tell you that Plumbers have the best of it. WINTER and SUMMER the Plumber is busy at top wages. No skilled Plumber is ever out of a job—compare his opportunities with any trade, plus the opportunities of having your own shop.
We teach you Plumbing with TOOLS (not books) under Licensed Master PLUMBERS in one of the finest equipped schools in America. We make you a Plumber, every branch is taught thoroughly—Lead Work—Blueprint for plan reading—all other tricks.

LEARN IN 30 WEEKS WITHOUT PREVIOUS EXPERIENCE

If you like to work with tools you owe it to yourself to investigate. No need to ever work as an apprentice. Get free bulletin. Write now! G.I. APPROVED. Our 24th year.

UNIVERSAL PLUMBING SCHOOL
819 HOLMES STREET — KANSAS CITY, MO.

RADIO BOOKS 10¢

Get Started in Radio

TEN "HOW-TO-DO-IT" BOOKS

Get a solid foundation in radio by means of these 10c timely text books. Each clearly written, profusely illustrated, contains over 15,000 words. You'll be amazed at the wealth of information packed into these handy books. Excellent for reference—ideal for technical library. Your money back if not satisfied.

5 Books for 50c- 10 Books for $1

We cannot send less than 5 books.

SENT TO YOU POSTPAID

No. 1—How To Make Four Doerle Short Wave Sets
No. 2—How To Make The Most Popular All-Wave 1 and 2 Tube Receivers
No. 3—Alternating Current for Beginners
No. 4—All About Aerials
No. 5—Beginners' Radio Dictionary
No. 6—How To Have Fun With Radio
No. 7—How To Read Radio Diagrams
No. 8—Radio for Beginners
No. 9—Simple Electrical Experiments
No. 10—Television

Remit by check or money order—register letter if you send cash or stamps.
RADIO PUBLICATIONS, 27Z West Broadway, New York (7)

LAW...

STUDY AT HOME Legally trained men win higher positions and bigger success in business and public life. Greater opportunities now than ever before.

More Ability: More Prestige: More Money We guide you step by step. You can train at home during spare time. Degree of LL.B. We furnish all text material, including 14-volume Law Library. Low cost, easy terms. Get our valuable 48-page "Law Training for Leadership" and "Evidence" books FREE. Send NOW. **G. I. APPROVED.**
LASALLE EXTENSION UNIVERSITY, 417 South Dearborn Street
A Correspondence Institution, Dept. 683-L, Chicago 5, Ill.

STAY HOME AND MAKE MONEY!

—Men! Women! Get into profitable, uncrowded profession you can operate from your home or small office after short home training course. No capital required. No goods to buy. No age limit. Others earn $50.00 to $100.00 per week making famous Stephenson corrective foot devices to order. Foot sufferers everywhere pay gladly for relief. Send today for FREE BOOKLET.

STEPHENSON METHOD, Established 1894, 12-28 South Market St., Boston, Mass.

AIRPORT MANAGEMENT

Learn full fundamentals of airport operation, salesmanship, flight instruction, office management, and all phases of a successful career in aviation. Full year's instruction with flight in the modern $125,000 Brayton School. Write for Free Catalog.

BRAYTON AERONAUTICAL SCHOOL
Lambert Field — St. Louis 21, Missouri

AGENTS 300% Profit SIGN LETTERS

For Store Fronts and Office Windows. Anyone can put them on. Free Samples. Liberal Offer to general agents.
METALLIC LETTER CO., 441 N. Clark, Chicago 10

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women
Prepare NOW for next Examinations
Vets Get Preference
Mail Coupon today sure

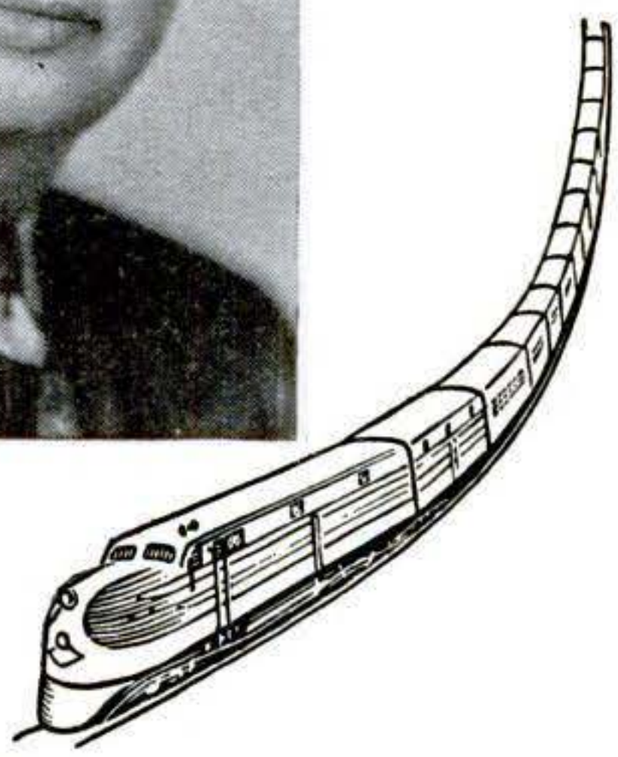
COUPON

FRANKLIN INSTITUTE
Dept. J116, Rochester 4, N. Y.
Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....

Address.....*Vet?*....

R. R. President never lets up!



"Following my graduation from the University of Illinois, I subscribed for and took a course with International Correspondence Schools. I thought then, as I do now, that the course was excellent. It is my opinion that adult education is real education."

W. A. JOHNSTON, PRESIDENT
Illinois Central System

AN I. C. S. TRUE STORY

WAYNE A. JOHNSTON at 47 is president of the Illinois Central—one of the nation's largest railroads. He got there by setting a definite goal for himself and never letting up in his efforts to reach it.

On graduation from college, Mr. Johnston started as an accountant with the Illinois Central. That's when a man of less industry and imagination would have let up on his studies. But Wayne A. Johnston enrolled for a course with International Correspondence Schools.

His progress to the top since then has followed that same pattern . . . never letting up . . . always asking "What else can I do?" Now, as one of the youngest presidents of a major railroad, he's still working and studying . . . to increase the efficiency of the Illinois Central, to modernize equipment even more, to keep on moving forward.

If *you* are asking "What else can I do?" you, too, may be destined for business leadership. The coupon gives you some idea of the more than 400 business and technical subjects I. C. S. can help you to master. Mark and mail it *today* for full information on the course in which you're interested.

INTERNATIONAL CORRESPONDENCE SCHOOLS

ICS

BOX 7686-L, SCRANTON 9, PENNA.

Without cost or obligation, please send me full particulars about the course *before* which I have marked X:

Business and Academic Courses
- ☐ Accounting ☐ Advertising
- ☐ Arithmetic ☐ Bookkeeping
- ☐ Business Correspondence
- ☐ Business Management
- ☐ Certified Public Accounting
- ☐ Commercial
- ☐ Cost Accounting
- ☐ Federal Tax
- ☐ First Year College
- ☐ Foremanship ☐ French
- ☐ Good English ☐ High School
- ☐ Higher Mathematics
- ☐ Illustrating ☐ Motor Traffic
- ☐ Postal Service
- ☐ Salesmanship ☐ Secretarial
- ☐ Sign Lettering
- ☐ Spanish ☐ Stenography
- ☐ Traffic Management

Air Conditioning and Plumbing Courses
- ☐ Air Conditioning
- ☐ Heating ☐ Plumbing
- ☐ Refrigeration ☐ Steam Fitting

Chemistry Courses
- ☐ Chemical Engineering
- ☐ Chemistry, Analytical
- ☐ Chemistry, Industrial
- ☐ Chemistry, Mfg. Iron & Steel
- ☐ Petroleum Refining ☐ Plastics
- ☐ Pulp and Paper Making

Civil Engineering, Architectural and Mining Courses
- ☐ Architectural Drafting
- ☐ Architecture
- ☐ Building Estimating
- ☐ Civil Engineering ☐ Coal Mining
- ☐ Contracting and Building
- ☐ Highway Engineering
- ☐ Lumber Dealer
- ☐ Reading Structural Blueprints
- ☐ Sanitary Engineering
- ☐ Structural Drafting
- ☐ Structural Engineering
- ☐ Surveying and Mapping

Communications Courses
- ☐ Electronics
- ☐ Practical Telephony
- ☐ Radio, General
- ☐ Radio Operating
- ☐ Radio Servicing
- ☐ Telegraph Engineering

Electrical Courses
- ☐ Electrical Drafting
- ☐ Electrical Engineering
- ☐ Electric Light and Power
- ☐ Lighting Technician
- ☐ Practical Electrician
- ☐ Power House Electric
- ☐ Ship Electrician

Internal Combustion Engines Courses
- ☐ Auto Technician ☐ Aviation
- ☐ Diesel-Electric
- ☐ Diesel Engines ☐ Gas Engines

Mechanical Courses
- ☐ Aeronautical Engineering
- ☐ Aircraft Drafting
- ☐ Flight Engineer
- ☐ Forging
- ☐ Foundry Work
- ☐ Heat Treatment of Metals
- ☐ Industrial Engineering
- ☐ Industrial Metallurgy
- ☐ Machine Shop
- ☐ Machine Shop Inspection
- ☐ Mechanical Drafting
- ☐ Mechanical Engineering
- ☐ Mold-Loft Work
- ☐ Patternmaking—Wood, Metal
- ☐ Reading Shop Blueprints
- ☐ Sheet-Metal Drafting
- ☐ Sheet-Metal Worker
- ☐ Ship Drafting ☐ Ship Fitting
- ☐ Tool Designing ☐ Toolmaking
- ☐ Welding—Gas and Electric

Railroad Courses
- ☐ Air Brake ☐ Car Inspector
- ☐ Diesel Locomotive
- ☐ Locomotive Engineer
- ☐ Locomotive Fireman
- ☐ Railroad Section Foreman

Steam Engineering Courses
- ☐ Boilermaking
- ☐ Combustion Engineering
- ☐ Engine Running
- ☐ Marine Engineering
- ☐ Steam Electric ☐ Steam Engines

Textile Courses
- ☐ Cotton Manufacturing
- ☐ Rayon Weav'g ☐ Textile Desig'ng
- ☐ Woolen Manufacturing

*Name*_____ *Age*_____ *Home Address*_____

*City*_____ *State*_____ *Present Position*_____

*Working Hours*_____ *A.M. to*_____ *P.M.* **Length of Service in World War II** _____

Special tuition rates to members of the Armed Forces. Enrollment under the G.I. Bill of Rights approved for War II Veterans.
Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

Copyrighted material

WAR SURPLUS

For the Sportsmen—Young or Old
All Year 'Round Use

Perfect all wool Olive Drab

SLEEPING BAG

Comes in handy for fishing trips, hunting, camping, boating, just roughing it or use as auto robe and many other purposes. Has warmth of 2 blankets; zipper slide fastener; tie-strap on bottom; approx. Gov't cost $12.90, **our price Ea.** **$3.95**

Outside Cover for Sleeping Bag—Water repellent..... **$1.89**

ARMY PUP TENTS

Perfect Without Pole **$2.95**

BLANKETS—Wool O. D., excellent condition..... **$4.85**
Perfect **CANTEENS**—used **65c** **SPURS**—Cavalry, New.... **95c**
Perfect **MESSKITS**—used **65c** **CANTEEN CUPS** **40c**
RAIN PONCHOS (used) Good condition..... **$2.25**
FLASHLIGHTS Angle Head—clipon—New **$1.00**
WATER PURIFIER—"Sunstill". New. Used by Air Forces and Navy to distill salt water into FRESH DRINKING WATER. Original Gov't cost, approx. $70.00—Our price..... **$9.95**

Pump Type GARDEN & TREE SPRAY

Slightly used, perfect condition. Can be used also as fire extinguisher, whitewash spray, etc. 4 gal. capacity **$3.95**

NEW GOGGLES

For skiers, fliers, campers, hunters, fishing, beach-wear, safetywear, motor-cycling, bicycling, boating and many other uses. Set comes complete (boxed) with 9 extra interchange-able shatterproof, flexible, cellulose acetate lenses. Amber, Green and white colors. A rubber flexible chamois lined goggle frame. Back adjustment head strap. Made for A. A. F. Cost Gov't approx. $4.50. **Our Price—EACH** **$1.59**

New Air Corp SUNGLASSES

Manufactured by Bausch & Lomb for U. S. Air Corps. Quality and Style with bone nose cross bar, individual case. Priced at big savings which **includes** postage.... **$8.95**

White Mattress Covers, 81x31", Excellent condition..... **$1.49**
Knitted SHORTS—White, New Men's size 32 to 46—3 for.. **$1.00**
MACKINAWS (used)—Water repellent, excellent condition, blanket lined, high collar with belt. Perfect as hunting, fishing coat, etc. Small, medium and large sizes **$4.95**
RAIN COATS (used)—Good condition. Small, medium and large sizes..... **$2.49**

Add 10% for postage—No COD—Send check or money order

AMERICAN SUPPLY CO., DEPT. P.S., 5TH & BROADWAY KANSAS CITY, MO.

Say You Saw

It In Popular Science

AIR RIFLES **BENJAMIN** **AIR PISTOLS**

ARE AVAILABLE

SEND FOR FREE FOLDER OF LATEST MODELS TODAY

If you want a **REAL GUN** for **PRACTICAL USE** inside or outdoors get a **SAFE-CLEAN-ECONOMICAL-BENJAMIN** with Adjustable Power and Amazing Accuracy. Use **BENJAMIN H-C PELLETS** for **BEST RESULTS. WRITE AT ONCE.**

BENJAMIN AIR RIFLE CO., 811 MARION ST., ST. LOUIS 4, MO.

REFRIGERATION

AND AIR CONDITIONING

TRAIN FOR YOUR OWN BUSINESS

Now, **not "next week."** is the time to start training for **a top-pay job in this vital field. A drastic** shortage **of trained service experts exists. Many** thousands **more will be needed for big post-war expansion caused by new industrial uses. Train NOW to get your pick of best jobs. We will give you the practical training you need. For 2 years we trained men and women for the Army and Navy only, in fine-precision aircraft instrument work. So our methods must be right. Common** schooling is all you **need. Our unique system makes** everything easy to grasp. **You can train at home and in** our big Chicago shops. Write **for full facts TODAY, without** obligation. Dept. P7-F

Approved for Veterans' G.I. Training

Millions of Old Units Need Expert Service. Big Building Boom Will Create Even More Opportunities.

INDUSTRIAL TRAINING INSTITUTE
2150 Lawrence Avenue, Chicago 25, Illinois

LAW

STUDY AT HOME for PERSONAL SUCCESS and **LARGER EARNINGS. 38 years expert instruction —over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"**

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 78-S, **646N.** Michigan Ave., Chicago 11, Ill.

The REAL ESTATE BUSINESS

Taught by an easy, home study method by nationally known school. G.I. Approved. Prepare for LIFETIME CAREER. Many earn up to $500 monthly. Sell while you learn. Write for FREE book.

FREE BOOK

WEAVER SCHOOL of REAL ESTATE, Dept. PC 15 E. Pershing Rd. Kansas City 6, Mo.

Learn LANDSCAPE GARDENING

A thorough, interesting, home study course for those who wish to become Landscapers, Gardeners, Designers, etc., for profit or pleasure. Write today for **Free Book** to

APPROVED FOR VETERANS **NATIONAL LANDSCAPE INSTITUTE** Dept. PS-6, 310 So. Robertson, Los Angeles 36

Big Money for Workers

In Home or Shop

Licensed Concrete Specialists wanted. No experience needed. Make *Colorglazed* concrete pottery without molds. New, low cost, patented method. Cemetery products, novelties, tiles, floors, etc. Basement leaksealing. Other big pay projects. Booklet, details free. Men only.

NATIONAL POTTERIES COMPANY
542 West Lincoln, Fergus Falls, Minnesota

BUILD YOUR OWN FAST FREEZER

PLANS $1.00

It's easy to build this household appliance and profitable to use. Save up to 75%. Operates on 110 or 32 volts. Plans show 5 sizes and are easy to follow. **ENJOY MAKING ONE OF** these freezers from new or used parts. No expert knowledge needed. Mail $1.00 bill or check for complete plans and catalog.

5 sizes 8 to 40 cu. ft.

LE JAY MFG., 423 LeJay Bldg., Minneapolis 8, Minn.

What Every Mason Wants

We have Important Masonic books for **Blue Lodge, Chapter, Commandery, Scottish Rite, and Shrine.**

OUR RITUALS ARE USED THE WORLD OVER

Send for free catalog of books and rituals for Masons, Odd Fellows, Knights of Pythias, Knights of Columbus, etc.

EZRA A. COOK, Publisher, P. O. 796, RJE Chicago 90, Ill.

Learn to Draw the

FIGURE BEAUTIFUL

Get these PICTURE-PACKED New Art Books

Featuring the Female Form in all its Beauty. They contain an assortment of Lovely, Curvaceous Artist Models, photographed in professional Art Poses, showing every curve and contour of the body, from head to toe, posed and in action. These books are a "must" for students of Art Anatomy, who wish to gain excellence in their work, where no "life" model is available.

Outside U. S. A. Send $1.75 each

These books come in 2 editions, Vol. 1 and Vol. 2

$1.50 each

MAJOR BOOK CO. (Dept B-2) LYNBROOK, NEW YORK

Copyrighted material

ELECTRICAL APPLIANCE REPAIRING

OFFERS BIG MONEY—INDEPENDENCE

If now employed start your home appliance repair business NOW in your spare time and be set with a business of your own no matter what happens. Operate from your garage, basement, kitchen, vacant store, etc. Work as many hours as you wish—the home appliance repairman is his own boss. It is a profitable occupation, for on many types of repairs it is not unusual for a repairman to charge on the basis of $5.00 to $6.00 per hour! Remember, there are millions of electrical appliances in this country. Appliances such as refrigerators, irons, sewing machines, vacuum cleaners, heaters, toasters, washing machines, motors, etc. To replace any of them is mighty expensive. That is why mechanically inclined men will find the Electrical Appliance Repair Business one that offers the trained man unlimited earning possibilities.

YOU CAN QUALIFY

All you need to become a successful electrical appliance repairman is ambition plus a little training at home in your spare time. If you are mechanically inclined—that is to say—can hold and use tools, our profusely illustrated course written in simple, easy to understand language will prepare you for the years to come. It does not matter if you have not had a great deal of schooling or have had no previous training along these lines. WE WILL TEACH YOU. Age should be no barrier—nor should any minor physical handicap.

WE TEACH YOU

Profusely illustrated with photographs and simple drawings we show you what troubles to look for and how to make each repair on an electrical appliance. We give you a good sound working knowledge of electricity, and how to do welding, nickel plating, etc. Our course shows you how to solicit business and keep it coming to you. Not a theory course but an honest to goodness course written by and used by repairmen the country over. Price of course is so low that the savings on your own household appliance repairs will quickly pay for it. Why work for others at the wages they want to pay you? Learn a good trade and operate your own business and determine just how long you work each day and the amount of money you make. ACT NOW!

MAIL COUPON TODAY

CHRISTY SUPPLY CO.
2835 N. Central Ave., Dept. D-5301
Chicago 34, Illinois

Please send me free illustrated literature about America's Fastest Growing Industry—ELECTRICAL APPLIANCE REPAIRING.

Name.....

Address.....

City.....State.....

Copyrighted material

WANT A REAL JOB OR A BUSINESS OF YOUR OWN?

BIG OPPORTUNITY

THIS COUPON MAY BE YOUR

REFRIGERATION—AIR CONDITIONING

Take a good look at the man you envy. What has he got that you haven't got? The chances are his success is simply a matter of training. He knows his job. He is a specialist in his field.

Why, then, should you be content with a small job at small pay. The door to opportunity is open today—wider than ever before. Now is the time to do something about your future.

Take a friendly tip. Investigate the field of Refrigeration & Air Conditioning. Here is an industry that offers every opportunity you could ask . . . good jobs, security—plenty of chance for advancement—a business of your own.

The Industrial Training Institute, **largest and most completely equipped school of its kind in the world,** will give you the practical training you need. You can start at home without giving up your present job and when you have completed your theoretical training, we will bring you to Chicago where you will learn the practical **"know-how"** by working on actual equipment in our big, expertly staffed shops.

No advanced schooling is needed. Our unique proved methods make everything easy to grasp. We've trained thousands. Pay as you go. Quit when you want to. But in any case our first responsibility is to prepare you for a better job and a happier future. And after you have graduated you enjoy all the advantages of our life-time employment service—wherever you go, whenever you need it.

FACTS ABOUT THE INSTITUTE

Founded in 1916. Has trained more than 400,000 men for practical work in industrial fields. From 1942 through 1945 trained specialized technicians, exclusively, for the Army, Navy and Marine Corps. Now training thousands of veterans under the G.I. Bill, both in its Residence Schools and by home-study. Occupies five buildings of its own. Has over $500,000 invested in training facilities, with an instruction staff of more than 100 men. Known everywhere as America's foremost school of practical training for industry.

ACT NOW

Don't delay. Time is passing fast. Mark and mail the coupon below. It will bring you, without obligation, full details of this and other courses, from which you may choose. Take the step that may be the turning point in your career to a better job and bigger earnings.

SEND FOR THIS BOOK —IT'S FREE

Industrial Training Institute,
2150 Lawrence Ave., Dept P2SR Chicago 25, Ill.

I am interested in getting ahead. Send me FREE copy of your "Camera Visit" book. I would like to train for_____(name field).

Name_____

Address_____

City_____

Are you a Veteran_____

GET THE FACTS ABOUT AMERICA'S FOREMOST SCHOOL OF PRACTICAL TRAINING

ILLUSTRATED AVIATION COURSE 48 LESSONS IN ONE BIG BOOK

at the bargain price of ONLY **$2** 7 Days FREE Trial

The COMPLETE FLYING MANUAL

For every aviator, every student pilot, everyone *planning* to be a flyer! Tested and proved visual method makes learning to fly as easy and enjoyable as learning to drive a car! Edited by Lieut. Col. Harold E. Hartney, U. S. Air Corps, Reserve. 340 sets of picture-diagrams and clear text describe every action in actual flying! Controls, taxiing, straight and level flying, climbing, gliding, turns, taking off, landing, navigation, instruments, etc., etc. 24 ground lessons, 24 air lessons! 128 giant pages, durably bound. SEND NO MONEY—order on postcard. After 7 days trial, return book or send only $2.00, plus postage, in full payment. Or send $2.00 now, and we will pay postage, same return privilege, refund guaranteed.

NATIONAL AERONAUTICS COUNCIL, INC.
Dept. 806, 37 W. 47th St., New York 19, N. Y.

One of America's Leading Radio and Television Schools

NEW YORK TECHNICAL INSTITUTE OF NEW JERSEY

158 Market Street, Newark, New Jersey

MAKE MONEY CASTING AT HOME

.. FREE FACTS SENT ..

Cast thousands of perfect Plaques, Book Ends, Ash Trays, Etc. Plaster, Liquid Marble, Etc. ENORMOUS PROFITS. Start in basement or garage. LITTLE CAPITAL NEEDED. QUICK, EASY, NO PREVIOUS EXPERIENCE NEEDED. Rubber molds for speed production. MAKE YOUR OWN. SAMPLE KIT $1.00. Canadian $1.50.

PLASTIC ARTS STUDIOS, Route 5, Dept. 45, Muncie, Ind.

SELL MERCHANDISE by Mail

OPERATE Profitable Lifetime Business Selling Merchandise by Mail. Large Profits on Fast Selling $1.00 Items. **WRITE TODAY!**

POWELL CO. DEPT. C SAMRLINER BLDG., *CLEVELAND 3, OHIO*

CORRESPONDENCE COURSES IN RADIO and ELECTRICAL ENGINEERING

Tuition $25

ELECTRICAL ENGINEERING. Get good grasp of wide electrical field. Modern. Very understandable. Theory made easy.

RADIO ENGINEERING. Extra fine course in radio, public address, photo-electric work. Trains you to be super-service man, real vacuum tube technician. Tuition ONLY $25. either course. Deferred payment plan. Servicemen needed badly.

FREE Write for free copies of school catalogs, student magazines, etc.
LINCOLN ENGINEERING SCHOOL, Box 931-S-102
LINCOLN, NEBR.

RADIO

ENGINEERING Television, FM, Broadcasting, Servicing, Electronics, Aviation, Marine & Police Radio taught thoroughly. 72 weeks' Engineering course equivalent to 3 years' college radio work. Approved Veteran Training. Catalog upon request.

Valparaiso Technical Institute. Dept. 503, Valparaiso, Ind.

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women
Prepare NOW for next Examinations
Vets Get Preference
Mail Coupon today sure

COUPON

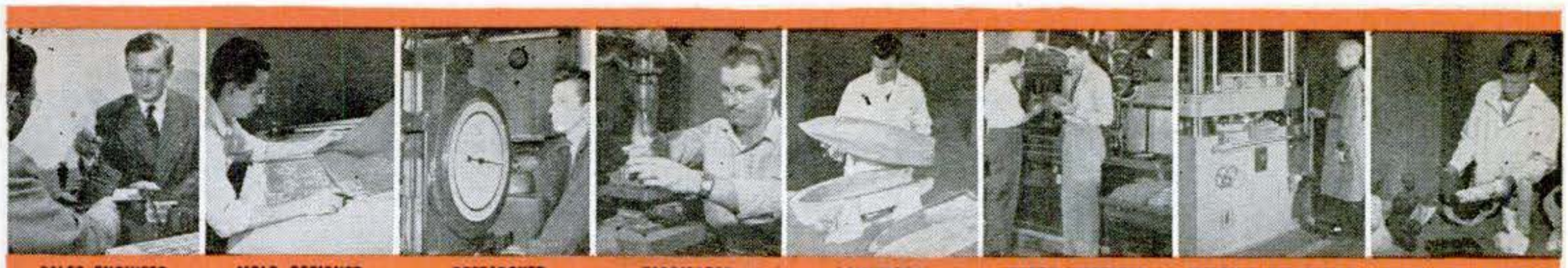
FRANKLIN INSTITUTE
Dept. J81 Rochester 4, N. Y.

Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....

Address..... .....*Vet?*....

Copyrighted material



SALES ENGINEER | MOLD DESIGNER | RESEARCHER | FABRICATOR | LAMINATOR | PARTS INSPECTOR | MOLDING TECHNICIAN | YOUR OWN BUSINESS

WHICH CAREER IN PLASTICS DO YOU WANT?

Plastics is one of the fastest growing industries—offering you unusual opportunities for an interesting, successful career and security in the years ahead. Trained men, with plastics know-how will fill the important, well-paying positions. YOU can be one of them Mail the coupon below for a big, colorful, free catalog on Plastics and complete details about Plastics Institute, America's oldest and largest plastics school. Resident School located in beautiful Southern California Comprehensive Home Training Courses to prepare you in your spare time at home for a career in plastics. You can enroll immediately! Write Plastics Institute, Dept. PS7-6, 1601 S. Western Ave., Los Angeles 6, California.

APPROVED FOR VETERANS

LEARN BY DOING

To give you practical experience we supply colorful plastics to make useful, attractive creations. You can also make and sell plastics articles to earn while learning

Plastics **INDUSTRIES TECHNICAL INSTITUTE**

NEW YORK CHICAGO LOS ANGELES

FREE BOOKLET

Plastics Industries Technical Institute
Dept. PS7-6, 1601 S. Western Ave., Los Angeles 6, Calif.

Mail in Envelope or paste on penny postcard

Gentlemen: Please send me the booklet "World of Plastics" and information on your Resident School Courses ( ) Home Training Courses ( ) I understand there is absolutely no obligation

Name (PRINT)..... Occupation.....

Street (PRINT)..... Age.....

City..... Zone..... State.....

Important: Please fill out coupon **Completely**. If Veteran, please check. ( ) If in Armed Services now, please check. ( )

PLASTICS INSTITUTE in the heart of sunny Los Angeles. Here modern laboratories and shops give Resident School students facilities for practice on the finest of industry-type plastics equipment. Also the headquarters for HOME TRAINING.

IMAGINE THEIR JOY WHEN THEY FOUND THEY COULD PLAY

This easy-as-ABC way!

LEARNED QUICKLY AT HOME
"I didn't dream I could actually learn to play without a teacher. Now, when I play for people they hardly believe that I learned to play so well in so short a time."
*H.C.S., Calif.

PLAYS AT DANCES
"Your lessons have been most satisfactory. I can play all of the popular songs. I have earned money playing at dances."
*E.N.J., New York.

PLAYS ON RADIO
"I can't keep from telling you that I have a good position playing from KTHS, Hot Springs, Ark., every morning."
*J. S., Okla.

What Instrument Would You Like to Play?

JUST name your instrument and we'll show you how you can learn to play it—quickly, easily, in spare time at home. Never mind if you don't know one note of music from another—don't worry about "special talent." And forget all you've ever heard about music being hard to learn.

The truth of the matter is that *thousands now play who never thought they could!* Yes, men and women everywhere have discovered this amazingly easy way to learn music at home. Now they are enjoying the thrilling satisfaction of playing the piano, violin, guitar, saxophone or other favorite instruments. Some of them are playing in orchestras and over the radio; others are teaching music, making money in spare or full time. And thousands are having the time of their lives playing for their own enjoyment and the entertainment of their friends.

LEARN TO PLAY BY NOTE
Piano Guitar
Violin Saxophone
Organ Mandolin
Tenor Banjo
Hawaiian Guitar
Piano Accordion
Or Any Other Instrument

No tedious study and practice, no tiresome exercises. You learn to play *by playing*—start right in with the melody of a simple tune! It takes only a few minutes a day; the cost is trifling. Does it sound too good to be true? Mail the coupon and get the FREE PROOF!

FREE PRINT AND PICTURE SAMPLE

Fascinating illustrated booklet answers all your questions; free Print and Picture Sample shows how method works. If interested, just mail coupon. U. S. School of Music, 86 Brunswick Bldg., New York 10, N. Y. (49th year)

**Actual pupils' names on request. Pictures by professional models*

U. S. SCHOOL OF MUSIC
86 Brunswick Bldg., New York 10, N. Y.

I am interested in music study, particularly in the instrument indicated. Please send me your free illustrated booklet, "How to Learn Music at Home" and the Free Print and Picture Sample.

Name.....
(PLEASE PRINT)

Address.....

Instrument..... Have you Instrument?.....

Copyrighted material

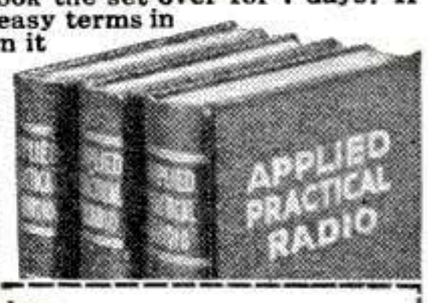
RADIOMEN! ELECTRICIANS!

Get this Valuable Book FREE for Merely Examining Coyne's NEW Pay-Raising 3 VOLUME SET APPLIED PRACTICAL RADIO

Tells How to Start Your Own Shop

Here's real news for every man interested in Radio. **A sensational new PRACTICAL set of radio books, just off the press!** Nothing like it ever before. Gives you the "know how" on everything in Radio today. Basic principles to the newest in Television and FM—how to construct, install, service. 600 illustrations, nearly 1000 pages. To prove how valuable these great books can be to you, **Coyne will give you a FREE copy** of our new 240-page book "Starting & Operating a Profitable Radio or Electrical Business" **just for looking over the 3 Volume Set.** For home training or field reference, APPLIED PRACTICAL RADIO is backed by Coyne's 48 years of shop experience to help you to **bigger pay, better jobs, greater opportunities in Radio.**

OFFER LIMITED—ACT NOW! Here's our offer to you—if you act promptly. We will send you the 3 volume set APPLIED PRACTICAL RADIO for 7 days' FREE examination, together with the Business-Starting Book. Look the set over for 7 days. If you like it, you can then pay the low price at easy terms in coupon below. If you don't want the set, return it and YOU OWE NOTHING. **In either event, you keep the Business-Starting Book absolutely FREE.**



FREE BOOK COUPON

SEND NO MONEY! Coupon below is just a request to see the books free and get your gift book for doing it. ACT—Send coupon TODAY!

Educational Book Publishing Division,
COYNE ELECTRICAL & RADIO SCHOOL, Dept. A7-R7,
500 South Paulina St., Chicago 12, Illinois

Send me that 3 volume set APPLIED PRACTICAL RADIO and my FREE gift book "Starting & Operating a Profitable Radio or Electrical Business". I'll either return the set in 7 days and owe nothing, or send you $3 within 7 days after I receive the books and $3 a month until $10.75 is paid. Or I'll pay $9.75 cash. **Whether or not I keep the 3 Volume Set, the Business-Starting Book is mine FREE as a Gift.**

NAME _____ AGE _____
ADDRESS _____
TOWN _____ ZONE _____ STATE _____

FREE BOOK

Now for EVERY WORK SHOP!

NEW Invention Electroplates by BRUSH

Easy to Plate CHROMIUM
GOLD, SILVER, NICKEL, COPPER
. . . For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc. with a durable, sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE! *Mail Coupon.*

WARNER ELECTRIC CO., DEPT. M-6
1512 Jarvis Avenue, Chicago 26, Ill.

FREE Details & Sample!

WARNER ELECTRIC CO., 1512 Jarvis Avenue, Chicago 26, Dept. M-6
Gentlemen: Send Free Sample and Details to:
Name _____
Address _____
City _____ *State* _____

REFRIGERATION and AIR CONDITIONING

REFRIGERATION TRAINING Since 1927

MECHANICAL units everywhere need servicing. Soon new units will require installation service. You can be ready with reliable pay-knowledge of this big income field. Unique home study-plus actual practice plan prepares you to enter servicing or installing field or get into business of your own. Great opportunities now and later. Get the facts FREE. No obligation. Write today.

Training approved under G.I. Bill

UTILITIES ENGINEERING INSTITUTE
1314 W. Belden Av., Dept. 367, Chicago 14, Ill.

APTITUDE TESTS

discover the kind of work or studies best for your success! You get a personal report—a guide for life—more happiness—more prosperity. (for men, women, boys, girls.) Write for complete facts.

VOCATIONAL COUNSELING INSTITUTE
5057 Woodward Ave., Detroit 2, Michigan

STAMMER?

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 46 years. **Benj. N. Bogue, Dept. 1898, Circle Tower, Indianapolis 4, Ind.**

GET THIS FREE BOOK!

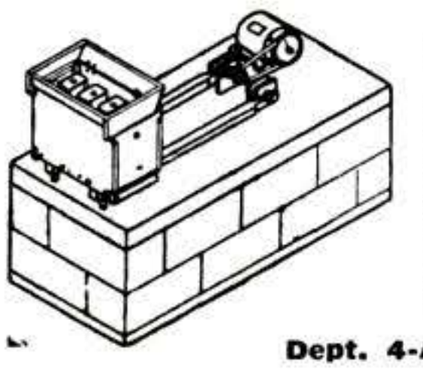
LEARN-WATCH REPAIRING at Home

"FREE information write-American Institute of Specialized Watch Repair—P.O. Box 117, Dept. 2, Grand Rapids, Michigan.

GET INTO CARTOONING!

Learn cartooning from a **professional** cartoonist! Create **original** cartoons and ideas. Send for free details about course. Also cartoonists' magazine. Full of lessons, plans, etc. Only 25c coin postpaid.
Hartman Studios, 2776 California Court, Lincoln 8, Nebr.

BUILD THIS CONCRETE BLOCK MACHINE



Sell blocks; or build your home, garage, barn, or filling station at 1/3 cost by making and laying your own blocks.

This simple machine which you can build yourself at a cost of $15 (excluding motor) will make a block in 30 seconds using only one form. Mass production can be achieved by a new simple method of removing blocks which allows two to four forms to one vibrator. Power driven concrete mixer plans also. Send dime for details and "How to Make and Lay Blocks" folder.

U-BUILD-IT SERVICE
Dept. 4-A, 206 West Wilder St., Tampa 3, Florida

BURN WATER IN YOUR CAR

COSTS LESS THAN GAS

More Power, Cleaner Motor.
Mail card for data on $17.50
Water-injecting Carburetor.

OCTA-GĀNE
2425 E. 57TH ST. • LOS ANGELES 11, CAL.

CODE SENDING-RECEIVING SPEED

Learn to send and receive Radio Code with greater speed. Stop nervous tension. Have confidence. Be proficient. Same system used by radiotelegraph specialists. Thousands of operators needed. Rush name for FREE book.

CANDLER SYSTEM CO.
Dept. 6-G, Box 928, Denver 1, Colo., U. S. A.

GOOD MONEY FOR YOUR SPARE TIME!

Be our Dealer in your locality for STRONG UNION MADE WORK AND SPORT GARMENTS. No experience necessary. Easy work. Millions of workers buy work uniforms. We supply everything needed. Write immediately for FREE Outfit.

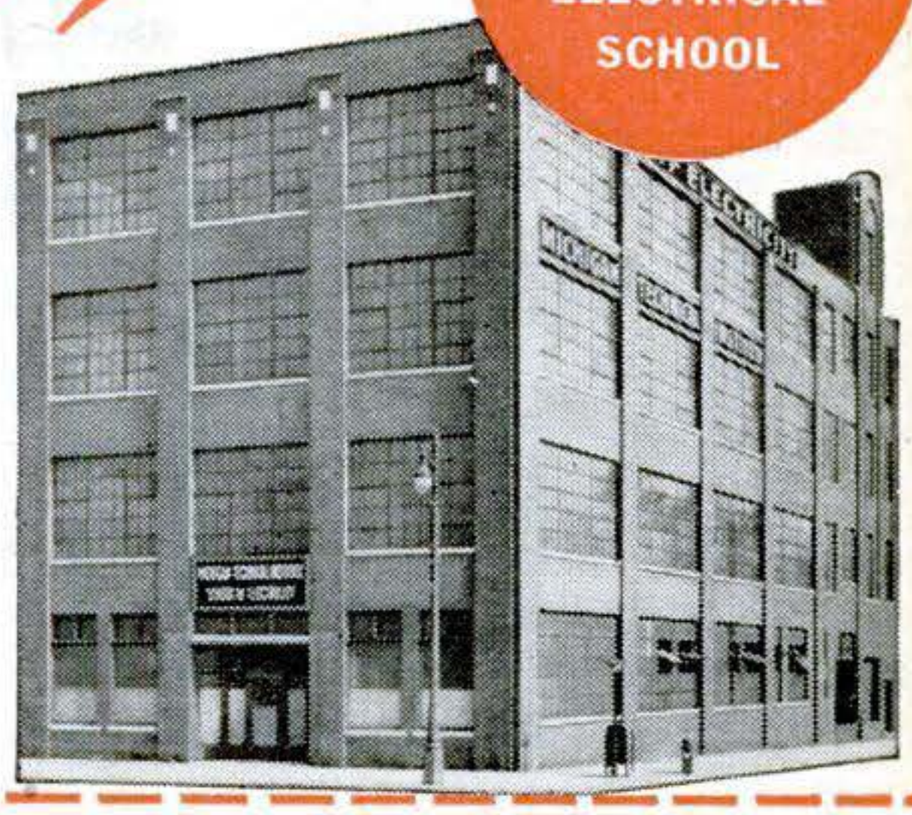
ROBT. STRONG GARMENT CO., 319-337 W. Van Buren St., Dept. B-6, Chicago, Ill.

Copyrighted material

GET INTO HIGH-PAY WORK!

ELECTRICITY

NATION'S LARGEST EXCLUSIVE ELECTRICAL SCHOOL



PRACTICAL "Learn-by-Doing" TRAINING ONLY 19 WEEKS...QUICKLY, THOROUGHLY

Here's the trade that's bound to boom . . . *Electricity!* Learn Electricity in 19 weeks . . . in one complete course at Nation's Largest Exclusive Electrical School. Learn House Wiring, Factory Wiring, Construction and Industrial Maintenance, the Operation, Maintenance and Repair of AC and DC Motors, Generators, Controls, other Power Equipment in office buildings, hotels, factories, etc., Armature and Motor Rebuilding.

"Learn-by-doing" . . . latest, most advanced methods . . . easily, quickly, thoroughly. Course supplemented with movies and slide films as proved by success of Army training. Expert instructors, individual attention. Day and evening classes, full or part time. We will finance your training. Coupon brings more information. Close supervision between Veterans Administration and school.

MICHIGAN TECHNICAL INSTITUTE

Dept. PS-6 2281 W. Fort St., Detroit 16, Mich.

APPROVED FOR TRAINING UNDER GI BILL

VETERANS! Take this course at no cost to you, and receive $65 to $90 a month while training. Complete details furnished.

MAIL COUPON TODAY!

MICHIGAN TECHNICAL INSTITUTE Dept. PS-6
2281 W. Fort St., Detroit 16, Michigan

☐ Send me catalog and complete information.
☐ I am a GI. Send special information.
☐ Married. ☐ Single.

NAME.....
ADDRESS.....
CITY..... STATE.....

A DOZEN ERRANDS FOR JUST ONE CENT

RIDE ONE AND YOU'LL BUY ONE!

Shopping, errands, commuting, are so thrifty, so much *fun* with a dependable WHIZZER Motor on your bike! 125 miles to the gallon! 5 to 35 m.p.h.! Fits any man's balloon tire bike! If no local dealer yet, mail coupon *today!*

ONLY $97.55 PLUS TAX F.O.B. PONTIAC

ON A

WHIZZER

Whizzer Motor Company, Dept. 536, Pontiac, Michigan.
I enclose $99.97, which includes $2.42 Federal Excise Tax ( ) check or ( ) money order. Send me one Whizzer Motor complete, ready for installation.
If descriptive literature only is desired, check here ( ).

Name..... City.....
Street..... State.....

PREPARE YOURSELF FOR A COMMERCIAL RADIO OPERATOR'S LICENSE

To operate transmitters at Commercial Broadcast, Police Communication, Aeronautical, and other stations you must have a Federal Communications Commission License. Prepare yourself at home to qualify for 1st and 2nd Class Radio Operator's Licenses.

Empire Radio School's home study course teaches you the basic knowledge of radio receivers and transmitters required in F.C.C. examinations. This course, adapted for home study from the same resident course that was successfully given to students during the war, is thorough and practical. By easy graduated stages, Empire Radio School lessons enable you to master this fascinating, career building science.

COURSE INCLUDES:

60 Comprehensive Lessons
3 Nationally Known Textbooks
Student Note Book
Radio Receiver Construction Kit
20 Periodic Examinations

Approved as a Correspondence School under the Laws of the State of New York.

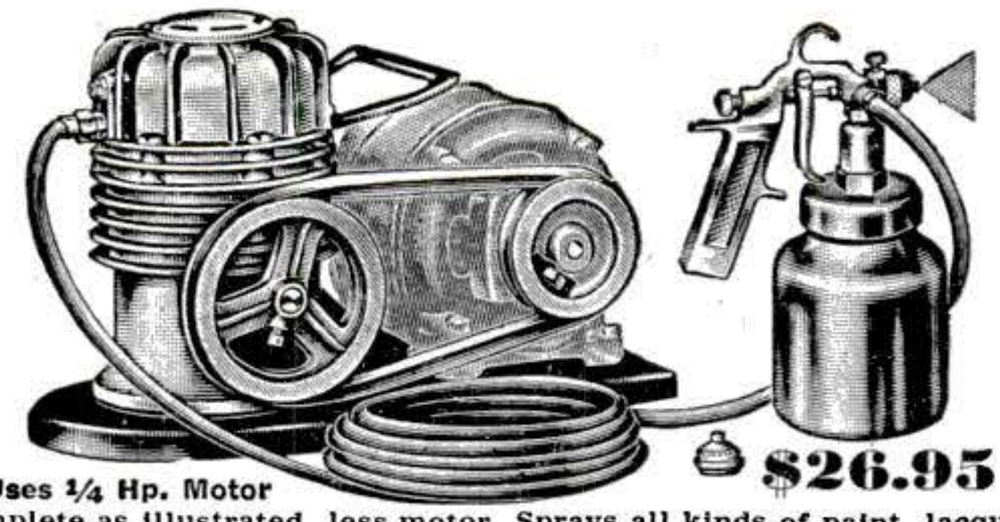
SEND IN COUPON BELOW FOR DETAILS

EMPIRE RADIO SCHOOL
P. O. Box 1170, Rochester, N. Y.
Without obligation, please send me your booklet, free and postpaid.

Name.....
Address.....
City..... State.....

Copyrighted material

Portable Paint Sprayers



$26.95

Uses 1/4 Hp. Motor

Complete as illustrated, less motor. Sprays all kinds of paint, lacquer, varnish, etc. Oil-less ball bearing compressor. 2 cu. ft. air per minute. 15 to 50# pressure. Sprays paint 5 times faster than hand brushing.

No. 890—Outfit complete as shown, with "V" belt, motor pulley, 15 ft. high test air hose and No. 112 gun, but without motor..... **$26.95**

No. 444—Outfit, twin cyl. 4 cu. ft. production type gun, 15 ft. air hose, reg. and gauge, V belt and motor pulley. Complete less motor, uses 1/2 H.P. motor **$47.50**

SPRAY GUNS—LOW PRESSURE

Operate on 15 to 50# pressure

#112—1 qt. cup.....$6.50 **#121—Production type $7.95**
#125—External mix..$9.50

Regulator & Gauge 0 to 160#.....$4.95
Air Filters.....$1.85
Air Hose—15 ft.....$1.75
Air Hose—25 ft.....$2.75
3 Gal. Paint tanks, with hose, reg. and gauge...$24.95
Less reg. and gauge..$16.50

NEW BLACK & DECKER ELECTRIC DRILLS 110V AC-DC

1/4" 2250 RPM.....$16.95 1/2" 375 RPM $31.95
1/4" Drill Stand .....$9.95 1/2" Drill Stand $14.95

SUPER-AIR AUTO ENGINE PUMP

Pumps 100# pressure for inflating tires, spray painting, etc. Complete with hose, pump, gauge, and spark plug adaptors **$4.75** Less gauge.....**$3.75.** 20c additional west of Rockies.

***Air Compressors—Paint Spraying Supplies. Gas engines—1/2 to 1 1/2 hp. $37.95 up.**

Immediate delivery—check or M. O. shipped prepaid. COD's plus charges.

INDIANA APPLIANCE CO.

20 East Sycamore Dept. PS-20 Evansville 9, Ind.

GASOLINE ENGINES

Briggs-Stratton or Wisconsin Air cooled 6 H. P. **$99.50**

LIGHT PLANTS

3,000 watts —110 volts **$149.50**

Above items (used—Government Surplus) guaranteed in good mechanical and operating condition.

Write for illustrated circulars.

MIDWEST SURPLUS SALES 1520 Locust St. Kansas City, Mo.

Mows and Trims Lawns

In One Simple Easy Operation

8 1/4 Lbs.

Save Time and Labor with a

MONTAMOWER

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, and sealed ball bearings. No tired backs or aching arms. 8 1/4 lbs. of live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass and weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters are self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory. Costs little. Write at once for guarantee information and literature.

MONTAMOWER DISTRIBUTING CO.

831 Keeler Bldg. GRAND RAPIDS 2, MICHIGAN

Practical Shop Training in AIR CONDITIONING

● *Domestic* ● *Commercial* ● *Industrial*

REFRIGERATION

Service Maintenance Installation

Write for Details

COMMERCIAL TRADES INSTITUTE

202 So. 20th St., Birmingham, Ala.

Approved for G. I. Training

. . Train in the Magic City of the South. .

Just Arrived! Imported

CONVERTIBLE CAR!

A mechanical marvel from U. S. Gov't. Zone in Germany. Flip a secret lever and presto! Top opens and closes automatically. Amazing! 6 3/8" long. Steering gear. Fine clockwork motor runs auto for long time. **$3.95. 3 gear car** also available. Shift lever for slow, medium, fast speed. Ingenious! **$3.95.** Satisfaction Guaranteed. No C.O.D.'s. We pay postage.

Q. T. NOVELTY CO., Inc.

Box 54, Station F, New York 16, N. Y.

BUILD A RADIO !

Fellows—anybody can **buy** a radio! The real fun is in building it yourself! Doesn't cost much either. Especially when you get this FREE 144-page catalog which lists everything you need—even the tools, at swell savings. Send for FREE catalog today.

LAFAYETTE RADIO Dept. KF-7
100 6th Ave., New York 13, N. Y.

HY-SCORE AIR PISTOL for ACCURATE SHOOTING

No pumping. Fast. Powerful. Finest made. Single shot. 30 1/2 oz. 10 1/4" long. $25.00 with pellets. Extra pellets per 1000 $2.50 for cal. .177. $3 for cal .22

SHOOTS CAL. .177 or .22 LEAD PELLETS

SEE YOUR DEALER OR ORDER DIRECT

Send 10c for circular to Dept. P-6

HY-SCORE ARMS Corp. BROOKLYN, I, N. Y.

ATHLETE'S FOOT TRY SWABS-ON

Send $1.00 to Fortune Chemical Co., 701 N. 63rd St., Phila., 31, Pa., for your bottle post paid to you on money back guarantee.

START A BATTERY FACTORY

—at home; the latest achievement; re-cast junk batteries into new. Complete instructions. We supply everything. Big profits!

THE BATTERY LABORATORIES

Dept. PS Minneapolis 13, Minn.

"MAGIC VANISHING CARD"

Throw it into the Air, It completely disappears; reproduce it later from spectator's pocket. It amuses and confuses all. Easy to do, 25c with Amazing Catalog of 300 Tricks.

THE MAGICIAN

Dept. 6, 2463 Kensington Ave., Phila, 25, Pa.

MAKE YOUR OWN

COSTUME JEWELRY

SPLENDID HOBBY OR VOCATION

Sea Shells • Pin Backs • Ear Screws • Screw Eyes
Plastic Discs • Ear Clips • Floral Stones • Jump Rings
Chains • Clasps • Wire • Boxes • Bracelets • Parts
Bow Knots • Catches • Plexiglas • Cements • Dyes

WRITE FOR FREE CATALOGUE • DEPT. E

PHILADELPHIA BADGE CO., 1007 Filbert St., Phila. 7, Pa.

Copyrighted material

SO YOU WANT TO MAKE GOOD IN RADIO!

Hollywood Expert Reveals Inside Story of Radio-Television Opportunities

By EDWARD CHARLES
Nationally known Hollywood Radio Reporter

Sitting here in the Hollywood headquarters of RADIO TRAINING ASSOCIATION OF AMERICA (R.T.A.), I recall the time in 1921, when I built my first radio crystal set from a cigar box. Then, it was mighty hard to believe that the infant Radio Industry would become one of the biggest in the world.

Today, from my vantage point here in Hollywood, home of R.T.A., the opportunities in Radio, Television and Electronics seem absolutely unlimited!

GOOD-PAY JOBS FOR HOLLYWOOD TRAINED MEN

New nation-wide developments in Television and FM hold promise of employing many thousands of skill-trained workers in near future. In Radio-Television Sales and Service alone, more than $65,000,000 is spent annually for repairs and parts. And consider the fields of Aviation, Police, Communications, Electronic controls in industry and medicine. No question about it, if a man is trained properly, by instructors closely associated with Radio here in Hollywood, he really should go places — fast!

INDUSTRY LOOKS TOWARD HOLLYWOOD'S EDUCATIONAL INSTITUTIONS

With such an ever-expanding field, the Radio-Television industry is looking more and more toward institutions like RADIO TRAINING ASSOCIATION OF AMERICA. R.T.A., located in the heart of Hollywood, is doing an outstanding job of training men for the growing needs of the Industry.

INTERESTING, FACTUAL FREE BOOK

Remembering that I had to learn Radio the hard way, I envy the ambitious men of today, whose success is speeded up through expert guidance of an organization like R.T.A., which is approved for Veterans.

I urge men seeking careers in Radio-Television and Electronics, to send at once for RADIO TRAINING ASSOCIATION OF AMERICA's new, free illustrated book which I found so valuable. You can obtain this free book by writing today to RADIO TRAINING ASSOCIATION OF AMERICA, Dept. PSR6, 5620 Hollywood Blvd., Hollywood 28, California. Or clip and send in the self-service coupon in the adjoining R.T.A. advertisement. I know you will thank me the moment you receive your free radio book.

LET HOLLYWOOD EXPERTS HELP YOU

LEARN FROM MEN CLOSEST TO RADIO-TELEVISION INDUSTRY!

Direct from Hollywood, center of America's Broadcasting, Television, Radio, Sound activities comes easy-to-learn, advanced home-instruction that quickly qualifies you for steady, good-pay jobs or business in Radio, Television, Electronics.

YOU GET PRACTICAL RADIO SHOP "KNOW HOW"

RADIO TRAINING ASSOCIATION OF AMERICA's (R.T.A.) professional methods assure quick step-by-step success. R.T.A. is located right "on-the-spot" where new technical developments are introduced. You receive finest shop-type instruction in latest Radio-Television techniques. Every R.T.A. student gets unlimited consultation from Hollywood on any subject pertaining to studies or work.

EARN EXTRA MONEY WHILE LEARNING

When you enroll with R.T.A. you get SPARE TIME JOB SHEETS showing how to earn extra money while being trained by R.T.A.'s Hollywood experts. When friends, neighbors know you are studying Radio, ample repair jobs are practically assured for you.

GET FACTS—SEND FOR FREE BOOK

telling all about R.T.A.'s modern streamlined training plan developed by veteran technicians in Hollywood, heart of vast Radio-Television field. Mail coupon today. Send for free illustrated book showing newest Radio-Television pictures. No obligation. Approved for Veterans. Send for big free book now!

APPROVED FOR VETERANS

RADIO TRAINING ASSOCIATION OF AMERICA

R.T.A., DEPT. PS6,
5620 Hollywood Blvd., Hollywood 28, Calif.

Send FREE BOOK showing how to make good in Radio-Television through training by Hollywood experts.

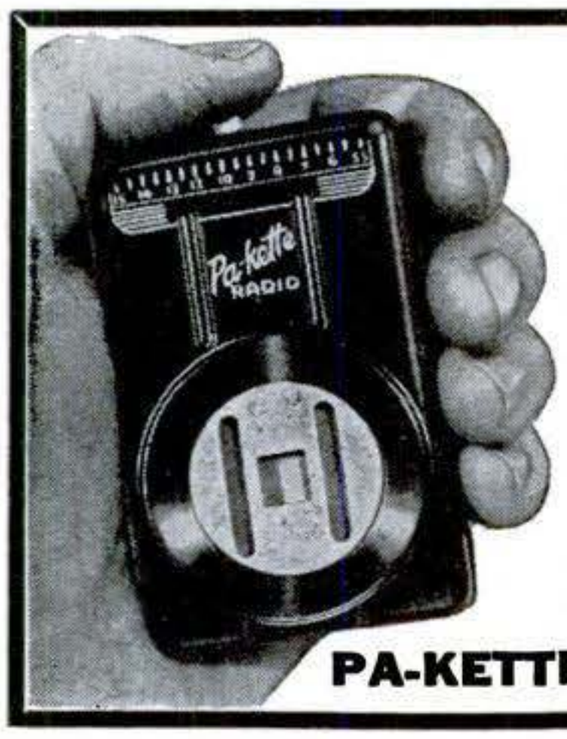
NAME_____ AGE_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Check box if VETERAN of World War II ☐

5620 HOLLYWOOD BLVD · HOLLYWOOD 28, CALIF.



AMAZING NEW Pocket or Purse Size RADIO!

Small as a pack of cigarettes! Weighs only a few ounces. Durable and beautiful black chrome plastic cabinets. Uses new pretested war born **crystal diode.** SLIDE RULE DIAL! REQUIRES NO TUBES—BATTERIES OR ELECTRIC "PLUG-IN" and should last for years. Many times you can receive local broadcasts simply by snapping to metal trim of phones, floor lamps, bed springs, etc.!

GUARANTEED TO PLAY for you if regular AG system used. **Complete instructions sent with each radio.** You can use it at home, in many offices, hotels, cabins, in bed or most anywhere! Lots of fun—and real entertainment!

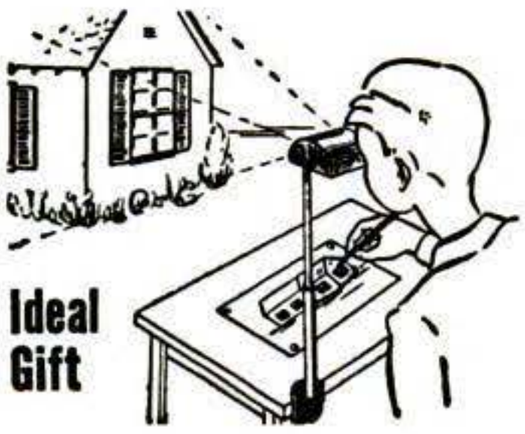
SEND ONLY $1.00 (cash, money order, check) and pay postman $2.99 plus delivery fees on arrival or send $3.99 for postpaid delivery. Complete as shown **ready to play** with self-contained personal earphone. **For gifts—children will love it—grownups too!** An exceptional value—order yours and enjoy the many good radio programs coming! **Don't be without your Pa-Kette Radio another day!** (All foreign orders $5.00 U. S. cash.)

PA-KETTE ELECTRIC COMPANY Department PS-6 Kearney, Nebraska

NEW DRAWING DEVICE NOT A TOY

DRAW ANYTHING YOU CAN SEE WITH LUCY!

No talent needed to draw scenery, objects, profiles, portraits or reduce copy, in perfect undistorted perspective, indoors or outdoors.



Ideal Gift

Commercial artists, fashion designers, architects, patent attorneys, hobbyists, doctors, children, find many practical uses for LUCY.

FINE FOR ART STUDENTS

A student looking thru LUCY draws, let us say, the outline of a building. Then, looking directly at the paper without benefit of LUCY'S magic, he fills in other details. Then a glance into LUCY shows where he drew them and where they should have been BOTH AT THE SAME TIME. A perfect art instructor, not a crutch.

LUCY IS AMUSING TOO

If you want to liven up a party, mount LUCY on a table so the guests can draw profiles of each other. Forget all other games. They'll play with LUCY by the hour.

DURABLY MADE, LOW COST

All metal, life-time construction, nothing else to buy, mounts on drawing board or table, no electricity needed, fully guaranteed. Only $6.95 postpaid with easy instructions. No COD or open accounts please. One day shipment. A precision instrument you'll be proud to own.

HOW IT WORKS

To the operator at B looking thru eyepiece of LUCY at A, a phantom view of subject to be drawn C appears already on the paper D in full perspective. Drawing becomes simple tracing. LUCY does NOT project view of subject to paper. The magic of LUCY'S clever optical system makes it look that way in eyepiece, and its just as easy to draw as though it was actually there. Adjustable to vary size of drawing.

BEELER ENTERPRISES Dep't F North Hollywood, Calif.

Copyrighted material

It would be perfect if business men could rid themselves of other major operational problems as easily as they now are able to "knock into a cocked hat" all record-keeping and tax work! For as little as 50 cents a day, depending on gross business, "Mail-Me-Monday" keeps *all* records and prepares *all* tax returns. It is the nationally accepted bookkeeping and tax service for independent businesses.

CONTACT OFFICE IN YOUR CITY, OR WRITE TO

"MAIL-ME-MONDAY"
BOOKKEEPING AND TAX METHOD

1929 FIRST AVE. DEPT. P SAN DIEGO, CALIF.

MORE THAN 125 OFFICES COAST TO COAST AND IN CANADA

Central Offices in Los Angeles, San Francisco, Kansas City, Chicago, New York, Atlanta

---

INVENTORS

IF YOU WISH TO PROTECT YOUR INVENTION, You should take steps to protect it by a U. S. Patent. Write me for "Record of Invention" form.

CARL MILLER
REGISTERED PATENT ATTORNEY

Woolworth Bldg., 35th Floor, Dept. 67C, New York City
Please send me "Record of Invention" form.

NAME.....

ADDRESS.....

PRACTICAL TECHNICAL TRAINING FOR YOU

Specialize in **Electronics, Radio, Electricity, Refrigeration, Heating and Air Conditioning, or Welding**

Prepare in **six** or **twelve** months for position as Technician, or in **three years** secure your **B.S. Degree** in **ELECTRICAL ENGINEERING** with a Machinery or Electronics Major.

Write for booklet, "Career Building."

MILWAUKEE SCHOOL of ENGINEERING
Institute of Electrotechnics

Dept. PS-647 North Broadway and E. State, Milwaukee, Wis.

ARTISTS MAKE MONEY

Do you like to draw? Send name, address, age and occupation for FREE ART TEST, to find out your ability.

ART INSTRUCTION, INC.
6147 Art Instruction Bldg., Minneapolis 15, Minn.

INVENTORS

The question as to whether a subject matter is patentable can be substantially determined by a search of the U. S. Patent records Without obligation, write us for full information on what steps an inventor should take to secure a Patent or Trademarks.

RANDOLPH & BEAVERS
Registered Patent Attorneys
905-L Columbian Building, Washington 1, D. C.

PATENTS AND TRADE MARKS

C. A. SNOW & CO.
REGISTERED PATENT ATTORNEYS
WRITE FOR INFORMATION TO
426 SNOW BUILDING, WASHINGTON 1, D. C.

INVENTING —FOR PROFIT!

If you have an inventive turn of mind, write for free 28-page booklet explaining how the Institute of American Inventors is helping inventors pre-test the profit possibilities of proposed devices to fill today's unprecedented demand for new inventions.

INSTITUTE OF AMERICAN INVENTORS
Dept. 3. 1926 Eye St. NW. Washington 6, D. C.

INVENTIONS WANTED AT ONCE

Patented or unpatented inventions, all types needed by manufacturers. Write for free booklet "MARKETING YOUR INVENTION" and Protective Disclosure Form. We have a tremendous list of firms who may pay cash or royalties for good inventions. For full particulars, write today.

NATIONAL INVENTION SERVICE
1404A Mitchell Street Oakland 1, Calif.

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women
Prepare NOW for next Examinations
Vets Get Preference
Mail Coupon today sure

COUPON

FRANKLIN INSTITUTE
Dept. J115, Rochester 4, N. Y.
Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....

Address.....*Vet?*....

Copyrighted material

Thompson BEATS the World on BOATS

Better Built Lower Prices

Safe Boats With Full Length Spray Rails

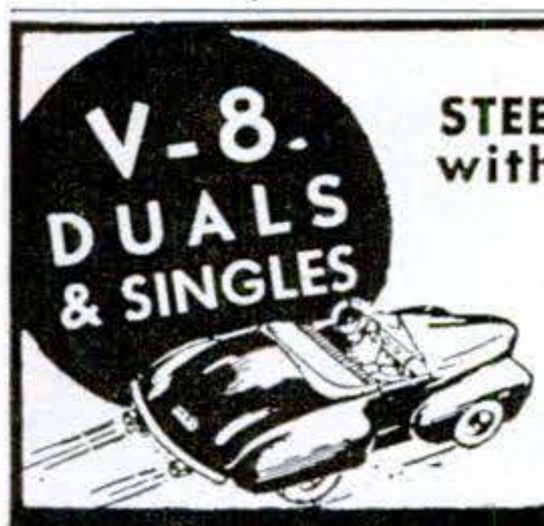
Keep passengers perfectly dry—even at high speeds. Catalog also shows two new models of "Take-Along" Boats. Two big factories—save you freight.

CATALOG FREE

Write for your copy. State kind of boat in which you are interested.

THOMPSON BROS. BOAT MFG. CO. (151)

219 Ann St., PESHTIGO, WIS. (*Write to either place*) 119 Elm St., CORTLAND, N.Y.



MUFFLERS

STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev, V-8, Plymouth, Steels $5.50, Aluminum $6.50. Chry., Olds., Buicks, etc., Steels $7.50, Aluminum $8.50. V-8 and MERCURY DUALS, Steel $17.50, Aluminum $20.00. Aluminums are guaranteed for life of your car.

DEALERS WANTED

SANDEE MUFFLER CO.

7523 S. WESTERN AVE., LOS ANGELES 44, CALIF.

10,000 MEN AND WOMEN WANTED

To use fruit jar conditioner. It levels all standard size screw top jars. removes nicks. Definitely ends all spoilage. mold. darkening of pears. juice extraction. etc. All new and old jars must be conditioned for perfect results. $7.50 prepaid in U. S. 3% tax in Wash. State. Free circular.

MIKALSON MFG. CO.

Dept. S Box 701 Everett, Wash.

BUILD 15 RADIOS

Absolutely No Knowledge of Radio Necessary
You need No Additional Parts or Tools

A 36 page book written by expert radio instructors, teaches you to build radios in a professional manner. You will start with a 1-tube receiver: Before you are done with this kit you will have built 11 receivers, 1 public address system and 3 transmitters.

The PROGRESSIVE RADIO KIT is the only Complete Kit. Contains everything you need: Instruction book, metal chassis, tubes, radio parts, soldering iron, pliers and cutters, screwdriver. Postage prepaid with check or M.O. C.O.D. Postage not prepaid. Write for further information..... **$19.75**

SPECIAL FREE OFFER for limited time only
FREE Electrical and Radio Tester with Each Progressive Radio Kit.

PROGRESSIVE ELECTRONICS CO., Dept. 85

22 Havemeyer Street Brooklyn 11, N. Y.

EXPERT ADVICE ON CONCRETE

Concrete products, masonry waterproofing. Uses and mfr. of cement. Up to four specific questions answered—$5.00.

"We have nothing to sell but knowledge"

San Antonio Laboratories, Dept. S, Box 6764, Cleveland, O.

PULVEX "DDT" FLEA POWDER

Replacement or Refund of Money — Guaranteed by Good Housekeeping — If Defective or Not As Advertised Therein

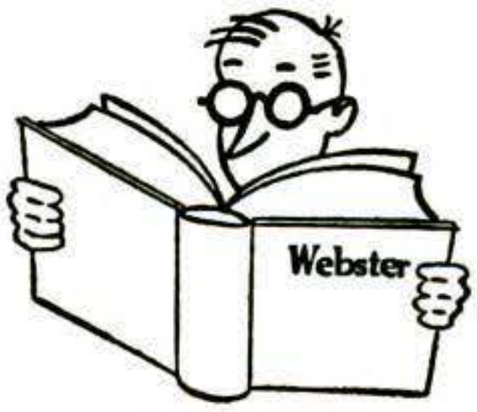
Kills the fleas *Quickly!* Keeps others off *for Days.*

Pulvex also comes with ROTENONE, the original formula. BEST FOR CATS.

Either Kind 25¢ & 50¢

Webster says:

"Pocket knife"
...pŏk'ĕt nīf



but it will pay YOU to say

CAMILLUS

Kă-MILL-us

No. 42
Size 3⅛"

For CAMILLUS means a knife of *finest value.* Hand honed blades of custom made steel.

Say "CAMILLUS" to your good neighbor, the local hardware or sporting goods dealer. We're doing our best to keep him supplied.

CAMILLUS *has the edge!*

CAMILLUS CUTLERY COMPANY, New York 17, N.Y.
Established 1876 . . . . Factory at Camillus, N. Y.

Say You Saw It In Popular Science

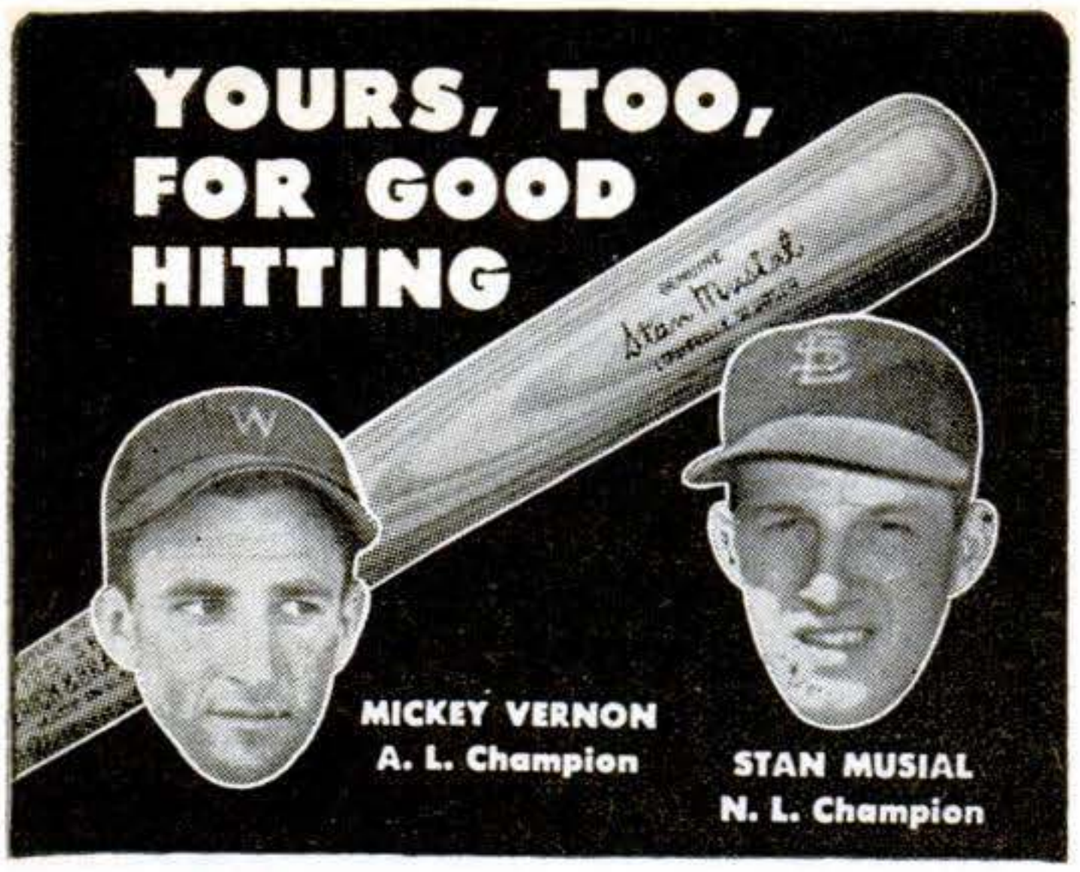
FINE TOOLS NEED FINE OIL!

• Lubricates
• Prevents Rust
• Cleans • Polishes

SOLD EVERYWHERE

3-IN-ONE *Oil*

Copyrighted material



The 1946 Champions swung to the top with their personally autographed Louisville Sluggers. Duplicates of their bats and other famous hitters are included in the 1947 Slugger line-up.

1947 Famous Slugger Yearbook
Ask your dealer or send 5¢ direct to
Dept. Z-34 Hillerich & Bradsby Co.,
Louisville 2, Ky.

LOUISVILLE SLUGGER — HILLERICH & BRADSBY Co. — LOUISVILLE KY

Louisville SLUGGER BATS
FOR BASEBALL & SOFTBALL

NEW MIDGET ELECTRIC ARC WELDER

FULLY GUARANTEED

RETAILS ONLY $3.95

Plugs into Light Socket AC or DC

It's new! It's handy! It's efficient! Use the Midget Electric Arc Welder for hundreds of light-metal jobs. Does comparable welding work with a 1/16 inch welding rod on thin metal as that of larger and higher priced welders. Operates on 15 ampere fuse, 110 volt 60 cycle A.C. or D.C. current, by use of our special standard-coated 1/16-inch welding rods. Generous supply of rods supplied with machine. Recommended for all light welding like automobile fenders, etc. Take the Midget Arc anywhere to the job. Sturdily built and fully guaranteed. Comes complete—ready to use. Nothing else to buy. No previous welding experience needed to strike an arc. In a short time, anyone mechanically inclined can learn to weld with this machine.

You'll find hundreds of money-saving, time-saving uses for the Midget Arc around your home, garage, or workshop. Also in garages, factories, repair shops, tin shops, mechanics, farmers, inventors, etc. Order a Midget Electric Arc Welder now! SEND NO MONEY. We'll rush one to you, complete with rods and helmet (equipped with APPROVED welding glass). Pay postman only $3.95 plus postage charges. If not satisfied, return Midget Arc in 5 days from receipt and we'll refund your money immediately. RUSH YOUR ORDER NOW.

MIDGET ARC WELDER CO., Strader Ave., Dept. Z-205, Cincinnati 26, Ohio

Wagemaker WOLVERINE BOATS
GRAND RAPIDS, MICH.

WOLVERINE BETTER BUILT BOATS THAT PERFORM LIKE CHAMPIONS

Wouldn't you like to own a Standard, De Luxe or Super De Luxe Molded Plywood Runabout? Available in 12'-14' and 16'. Many Models with Mahogany Trim and many other fine features. They'll give you speed, reliability, and superior craftsmanship, because many years of experience has taught us how to build better boats. Nearly 60 Models to choose from. Free literature gladly sent on request.

WAGEMAKER COMPANY
DEPT. 26 GRAND RAPIDS, MICH.

LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 38 years expert instruction—over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance."

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 78-S, 646 N. Michigan Ave., Chicago 11, Ill.

Make Your Pocket Coins Pay Big Dividends

You may have a valuable coin in your pocket right now. Hundreds of dollars are made each year from the sale of old coins. Know what coins are bringing today's high prices. Hansan's Coin Index brings you the latest authentic information. Subscribe now. $3 a year. Send 25c for trial issue. Money refunded if not satisfied. HANSAN'S COIN SHOP—1326 Main, Kansas City 6, Mo.

LEARN ELECTROPLATING

Highly Paid, Uncrowded, Interesting Business. Part or Full Time, Common School Education Sufficient. Gold, Silver, Nickel, Chromium, etc. Money Making Secrets, Processes. Send postcard for FREE Electroplating Booklet and proof. **PLATER HYDE, Dept. S, P. O. Box 176, National City, California.**

WHEELS FOR JUVENILE AND INDUSTRIAL USE
MANUFACTURER'S AND DEALER'S INQUIRIES INVITED.
CIRCLE METAL MFG. CO. * 4272 E. Pacific Way-Los Angeles 23, Cal.

LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25c, Other patterns: 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10c each. 25 Novelty Patterns, 30c. **All 62 Full Size Patterns, $1.00 Postpaid. Strother Pattern Service, Dept. 7-T, Box 383, Belington, W. Va.**

Raise GOLDEN HAMSTERS

The new wonder animals. Look like toy bears. Delightful pets. Everybody wants them. Thousands needed by laboratories. Make money, get started now. Send 10c for illustrated literature, or send $5 for a pair of hamsters and literature.

GULF HAMSTERY 1540 BASIL ST., MOBILE 17, ALA.

RUPTURED?

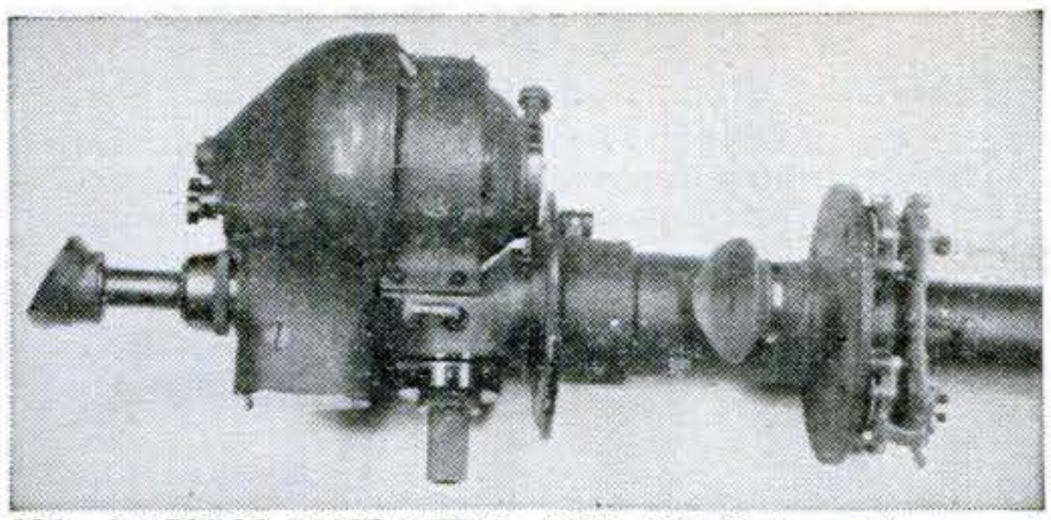
Get Relief This Proven Way

Why try to worry along with trusses that gouge you flesh—press heavily on hips and spine—enlarge opening—fail to hold rupture? You need the Cluthe. No leg-straps or cutting belts. Automatic adjustable pad holds at real opening—follows every body movement with instant increased support in case of strain. Cannot slip whether at work or play. Light. Waterproof. Can be worn in bath. Send for amazing **FREE** book, "Advice To Ruptured," and details of liberal truthful 60-day trial offer. Also endorsements from grateful users in your neighborhood. Write:

Cluthe Sons, Dept. 14, Bloomfield, New Jersey

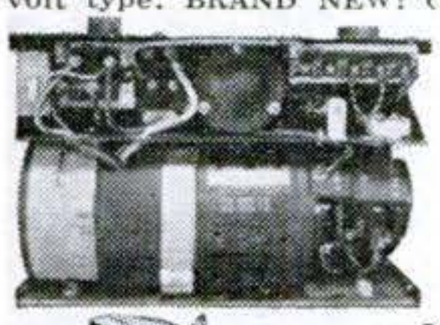
Copyrighted material

WAR SURPLUS BARGAINS!



101. AIRFORCE DRIFT METER, TYPE B-3. Built to close precision tolerance by Bendix for Bombers. Overall length 47". Net weight 24 lbs. Contains many valuable unreplacable items such as precision lenses, eyepieces, switches, electric gyroscope, filters, prisms, scales, etc. Invaluable to the experimenter. Used to determine drift of aircraft in flight. Cost many hundreds of dollars! Shipping weight app. 40 lbs. Slightly used. A bargain at only..... **$19.95**

102. AIRPLANE GENERATOR, TYPE L-3. Mfg. for Air force by Leece-Neville. 24 volt. Has been used for light welders, lite plants; as generators on airplanes, boats, etc. 24 volt type. BRAND NEW! Cost $212. NOW only.... **$24.95**



103. Triple Output Dynamotor

Input voltage 12 or 24 volts! Output is 300, 150 and 14.5 volts DC. RPM 6000, continuous duty, temperature rise 50 deg. C. Built by Bendix Radio. Has voltage regulator and fan for cooling. Weight approximately 18 lbs. Closing out at less than one percent of cost..... **$6.50**

104. Gas Powered Light Plant

HOmelite model HRU. Powered by 2½HP gasoline engine, one cylinder, two cycle. Generator attached; output 24 volts, 2000 watts, 70 amps. Used but reconditioned. Can be used as portable lite plant for farm, boat, camp, etc. Also usable for battery chargers, light arc welders, etc. Crated, shipping weight approximately 115 lbs. Original cost over $500. Now... **$75.00**

(State method of transit. Express or Freight)

105. AIRCRAFT MACHINE SCREW and RIVET ASSORTMENT. Treasure box of at least ten sizes of screws and ten sizes or types of aluminum rivets. Not mixed but in separate containers; contains well over 15,000 separate pieces of screws and rivets. Shipped in free metal mechanics tool box. Shipping weight app. 30 lbs. NOW only..... **$9.95**

106. MINIATURE ULTRA-HIGH FREQUENCE RADIO RECEIVER. Was used by Airforce as marker beacon receiver. 75 meg. Contains tubes, coils, tuning capaciters, RF amplification, leak condensers, many many more valuable parts. Circuits furnished. Shipping weight app. 5 lbs. Only **$9.95**

107. RADIO INTERPHONE AMPLIFIER TYPE RL-7. Fine interphone for experimenters, etc. Contains many valuable radio parts as well as tubes, 24 volt dynamotor (250 vt output), etc. Shipping weight 10 lbs..... **$9.95**

108. RL-7 interphone control box, with switches, etc..... **$1.29**

109. RADIO HEADPHONES, fine for hams, crystal, etc. Used but good condition. only..... **$1.10**

110. THROAT MICROPHONE, used condition, only..... **$1.00**

111. SOLENOID ELECTRIC VALVE, Type G102AY16CAL, Stewart-Warner, 24 volt. Shipping weight 3 lbs. only..... **$1.49**

112. DUAL CYLINDER HEAD TEMP. GAGE, 0 to 350 deg. Cent. 8 ohm lead type, iron constantan, Type 76AT3. When property wired can be used to record temperature of water, oil, cylinder heads, etc. Two sensitive micro amp jeweled movements! Brand new. Shipping weight 3 lbs..... **$6.95**

113. GYRO ASSEMBLY, Directional, Sperry Auto-Pilot. Has precision electric 110 volt gyroscope, one autosyn transmitter generator, one 110 volt AC motor, 11 electromagnets, bearings, gears, rings, plugs, etc. NEW! Weight 14½ lbs. **$9.95**

114. AMPLIFIER, Sperry Auto-Pilot, Rudder Servo Type; Includes two 1632, one 1633, one 1634 tubes; condensers, transformers, switches, resisters, terminals, tube sockets, chassis, etc. NEW. Weight 5 lbs..... **$2.95**

115. INDICATOR, Sperry Auto-Pilot, Pilot Director. Includes autosyn motor, indicator face, etc. NEW. 3¼" face. Weight 2 lbs..... **$1.95**

116. TOGGLE SWITCHES. Double pole double throw....$ .49
Single pole single throw....$ .39

117. INTERPHONE AMPLIFIER BC347A. 24 volt interphone 6" x 14". Without tube. Shipping weight 3 lbs. Only..... **$2.49**

118. MALLORY RADIO NOISE FILTER. Size 2½"x3"x3¼", metal box. For cutting noise between radio and motor, etc. Brand new. Shipping weight app. 3 lbs. Only... **$1.29**

IMPORTANT: We pay no shipping charges! Include adequate on cash orders to pay charges or we will ship collect charges. No orders accepted for less than $2.00. No C.O.D.'s shipped unless 20% deposit made in advance. App. shipping weight of each item is listed. Canadian orders, add $2.00 extra charge per order.

AERO INSTRUMENT COMPANY, Municipal Airport, Houston 12, Texas

FOR THE HOME CRAFTSMAN • FARMER • HOBBYIST • REPAIRMAN

Combined for the First Time!

- **1/4" CAPACITY ELECTRIC DRILL, AC-DC.**
- **13 SIZES OF HIGH SPEED DRILLS FROM 1/16" TO 1/4" IN INDEXED RACK.**
- **ALL IN ONE METAL CARRYING CASE FOR USE ON-THE-JOB OR IN THE SHOP.**

THE COMPLETE HI-SPEED

ELECTRIC DRILL KIT

- **AN ELECTRIC DRILL,** for light duty, engineered with balance and "feel." Makes drilling easier, more accurate. Research proves men prefer saw grip handle. Factory guaranteed for one year.
- **13 HIGH SPEED DRILLS,** the finest drills in the world, made of High Speed Tungsten-Molybdenum Steel to withstand temperatures of 1200°F. Sizes every 64th from 1/16" to 1/4" in indexed rack.
- **ALL IN ONE COMPACT, STEEL CARRYING CASE.** Sturdy, baked enameled steel case, only 10⅝" x 5⅜" x 3¼". Weighs only 5 lbs. complete. Tucks under arm or in corner of standard tool box.

$25.50 COMPLETE

ON SALE AT LEADING HARDWARE, AUTO SUPPLY AND DEPARTMENT STORES EVERYWHERE

OR MAIL COUPON DIRECT TO

UNIVERSAL TWIST DRILL WORKS
322 S. Green St., Chicago 7, Ill.

UNIVERSAL TWIST DRILL WORKS
322 S. Green St., Chicago 7, Ill.

Send me one Universal Hi-Speed Electric Drill Kit.
☐ Enclosed is my check ( ) money order ( ) for $25.50.
☐ Please ship C.O.D. plus postage and insurance.

Name _____

Street/Route _____

City/Town _____ State _____

Copyrighted material

MAKE UP TO $5.00 AN HOUR In Your Own YEAR 'ROUND Business!

ONLY A FEW DOLLARS PUTS YOU IN BUSINESS!

Many Clearing as High as $20 to $30 a Day *NET* Renewing Rugs, Carpets, Upholstery. New Method Now Used for Auto Upholstery. Write for Facts About Quick, Easy Way to Get Started

Here is the chance you've been looking for to step into a pleasant, dignified, big-pay business of your own that offers you a steady, year 'round income. Start on "a shoestring," full or spare time, right from your own home. Equal opportunities for men and women, young or old, in small towns or big cities. **No experience needed.** Many making big money with new Americlean System just cleaning auto upholstery. **Easy to learn.** We send you complete instructions and quick-cleaning supplies so you can start making money the very first day! Quick method cleans upholstery, rugs and carpets like new without taking off floor! Tremendous demand in homes, apartments, hotels, stores, office and public buildings. **Steady repeat** business. Territories going fast. Write today for full FREE facts. No cost or obligation. Rush letter or postcard now to

AMERICLEAN CO., Inc.
Dept. H-6; 211 North 7 St., St. Louis 1, Mo.

WRITE FOR FREE DETAILS NOW!

NORTHWESTERN *GI APPROVED* VOCATIONAL INSTITUTE

SUMMER CLASSES IN TELEVISION

Your opportunity is now. Learn the NORTHWESTERN way from skilled, highly trained instructors.

- **Radio Maintenance**
- **FM**
- **Radio Communications**
- **Industrial Electronics**

Day or night classes. New courses start every 30 days. Study in the heart of the Land O' Lakes. Don't let this opportunity pass. It's up to you! Write for free facts today!!

NORTHWESTERN VOCATIONAL INSTITUTE
Dep't. PS-6
745 Grand Ave., St. Paul 5, Minn.

BUILD YOUR OWN POWER LAWN MOWER

WHY BREAK YOUR BACK MOWING FIELD OR LAWN?

WRITE FOR FREE LITERATURE
The Rite-Way Mower Attachment ▶
Ball Bearing

SAVE MONEY SAVE TIME

Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.

IT'S FUN TO BUILD

T & H MFG. CO., Dept. S-3
811 E. 31, Kan. City 3, Mo.

G&E CRAFTSMEN'S BARGAINS

HI-POWER

ELECTRIC DRILL

Heavy duty ¼" drill. Light weight. Three jaw keyless chuck. Oil bronze bearings. 6 ft. flexible rubber cord with plug. 900 rpm at full load. Operates at 110 V. AC or DC. No. 6202 Each **$17.95**

A TREASURE CHEST OF RADIO PARTS

Contains transformers, condensers, dial controls, insulators, terminal connectors, coils, practically all types of switches. Many more useful items. **No. 6508 15 lb. Kit for only $4.50**

Send check or money order, including postage. No C.O.D.'s.
Write for new free parts catalog

G & E EQUIPMENT SUPPLY CO.
Dept. PM-16 400 N. SANGAMON ST., CHICAGO 22, ILL.

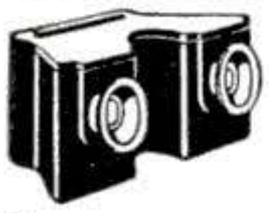
FOR STEREO PICTURES, IT'S

STEREO-TACH!

Take Third Dimension Pictures with the STEREO-TACH and your own camera!

There's nothing in photography so startlingly beautiful and lifelike! You *can't* reproduce a *3-dimension picture* in flat 2-dimension printing!

Outfit No. 101—'Tach and Transparency Viewer (for transparencies, with 35MM cameras) **$22.50***



Transparency Viewer

Outfit No. 100—'Tach and Print Viewer (for stereo prints, with both 35MM and other size cameras) **$16.25***
*Plus Tax.

The Stereo-Tach

For Third-Dimension Projection, the STEREO-FLECTOR! Just Out! *See your dealer or write.*

ADVERTISING DISPLAYS, INC. Dept. PS-4 COVINGTON, KENTUCKY

FREE! **Do You Want to Build Up Your Body—Gain Strength—Add or Lose Weight?**
To Inspire and Help You: We will send FREE a big 12" x 19" poster of "AMERICA'S BEST DEVELOPED ATHLETE." ALAN STEPHAN. Also **free** information on our valuable body-building, training, and health books for boys and men. Send us your name and address and 20c stamps or coin to cover **part** of handling and mailing costs! We do the rest! WRITE TODAY to

CROSS COMPANY Box 389 Dept. A-2 Kenosha, Wisconsin

I. GOLDBERG & CO.

Camping Supplies — Gov't Surplus
429 Market Street — Philadelphia 6, Pa.

NEW REGULATION G. I. PUP TENT $6.75 P.P. 35c
2-3-piece poles & 8 stakes

New GI Mountain Ruck Sack	$3.95	P.P. 35c
New Nylon Mountain Tent Aluminum Stakes & 2-3 Piece Poles	$12.00	P.P. 50c
New GI Canteen Cover & Cup	$1.95	P.P. 30c
New U.S.M.C. Camouflage Poncho	$1.95	P.P. 25c
Air Force Fishing Vest, 13 Pockets	$1.95	P.P. 25c

Write For New Free Catalog. Mail Orders Promptly Filled.

START YOUR OWN PHOTO COPY BUSINESS!

SMALL investment . . . BIG profits. No darkroom needed. EASY work. Write immediately for FREE 4 page folder and price list.

GENERAL PHOTO PRODUCTS COMPANY
15 Summit Avenue Dept. PS-1 Chatham, New Jersey

---

12 lbs. SURPLUS RADIO PARTS $2.00

A gold mine of parts for repairmen, amateurs, and experimentors . . . sockets, condensers, resistors, transformers, coils, hardware, wire, etc., etc. An outstanding bargain in **usable** parts! Send $2.00 cash, check or M.O. today! (Pay small express charges on receipt.)

ELECTRONIC PARTS, Inc. Dept. S-6, 400 West Madison St., Chicago 6, Ill.

BACKACHE, LEG PAINS MAY BE DANGER SIGN

Of Tired Kidneys

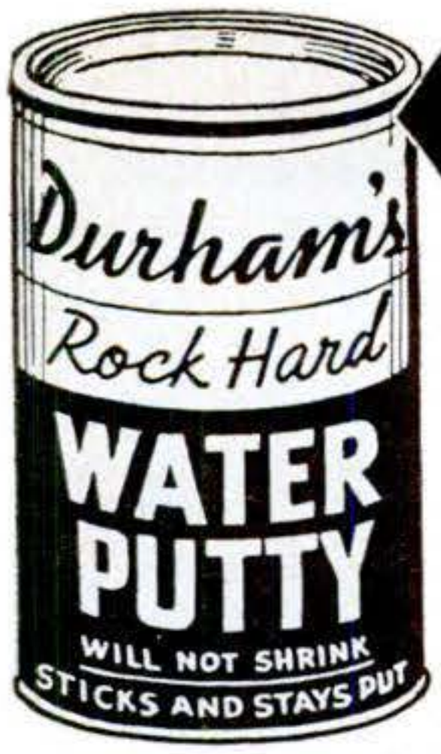
If backache and leg pains are making you miserable, don't just complain and do nothing about them. Nature may be warning you that your kidneys need attention.

The kidneys are Nature's chief way of taking excess acids and poisonous waste out of the blood. They help most people pass about 3 pints a day.

If the 15 miles of kidney tubes and filters don't work well, poisonous waste matter stays in the blood. These poisons may start nagging backaches, rheumatic pains, leg pains, loss of pep and energy, getting up nights, swelling, puffiness under the eyes, headaches and dizziness.

Don't wait! Ask your druggist for Doan's Pills, a stimulant diuretic, used successfully by millions for over 50 years. Doan's give happy relief and will help the 15 miles of kidney tubes flush out poisonous waste from the blood. Get Doan's Pills.

Copyrighted material



The Modern PLASTIC for lasting Home Repairs

PERMANENTLY mends cracks or holes in wood, tile, stone or plaster. Sticks and stays put—Does not chip, shrink or fall out. Easy to use. Economical. Mold it, chisel it, polish or paint it. If unobtainable from your lumber, paint or hardware dealer, the big 4-lb. can will be sent you postpaid (in U.S.) for only $1. Full money-back guarantee, order now.

DONALD DURHAM CO.
Box 804-F, Des Moines, Iowa

FREE MACHINING

BRASS and ALUMINUM

FOR HOME WORK SHOPS

Aluminum rod—11 inches, each size:
5 Pcs. ¼-in. to ¾-in. round by ⅛ths.....$1.00
3-ft. each size $2.50
Brass—same sizes—11 in. each.....$2.00
3-ft. each size $5.00

Write for price list. Shipped Express Collect. Send Check or M.O. to:

NON-FERROUS METALS CO.
P. O. BOX 1651 **WACO, TEXAS**

$2.50 Plus Tax POCKET WATCH BUY

Radium Dial $3.60 Gold Plated $4.50 Plus Tax

• An American beauty—here again. Genuine New Haven timepiece: accurate movement, modern dial, engraved back, polished metal case. Factory guaranteed. Limited quantity. Order fast. Send cash remittance, including 10% tax, we pay postage. Or pay postman C.O.D. plus 10% tax and few cents postage.

R. W. SUMMERS, LTD. 516 FIFTH AVE., N. Y. 18

NEW SCIENTIFIC LUCKY WEATHER BIRD

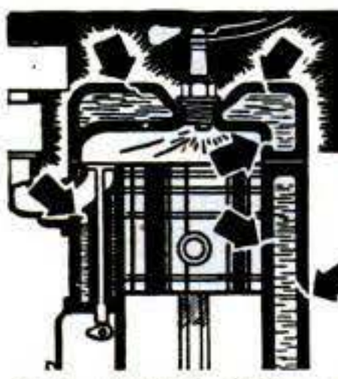
Out-guesses the Weather Man

THERMOMETER & WEATHER FORECASTER
This NEW Scientific Weather Bird accurately predicts the weather 8 to 24 hours in advance and as well gives you accurate temperature readings with a thermometer encased in the Lucky Weather Bird's Neck. 7" High. Be your own weatherman. Not an expensive barometer yet scientifically accurate.
Not Just a Toy! . . . A Real Weatherman Triple tested to U.S. Government standards, it registers temperature within 1 degree of accuracy. Wonderful for the home, office, factory, store, school & farm. MAIL YOUR ORDER NOW.

Tail Changes Color & Predicts Weather

$1.98 Post paid

Bernard Fine Co., 501 Sixth Avenue, New York 11, N. Y., Dept. WV-2
Write for Free Catalogue Special Prices for Dealers



REPAIR CRACKED BLOCKS AND HEADS—

External and internal leaks in blocks, cylinders and valve ports quickly and easily with LUSCO PLASTIC SEAL.
90 day Service Guaranteed or your money back. Send money order or check for full pint—more than sufficient for average repair . . .

$3.00 Postpaid

C F LUSK CO, 5916 Bonna Ave., Cleveland 3, Ohio

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women
Prepare NOW for next Examinations
Vets Get Preference
Mail Coupon today sure

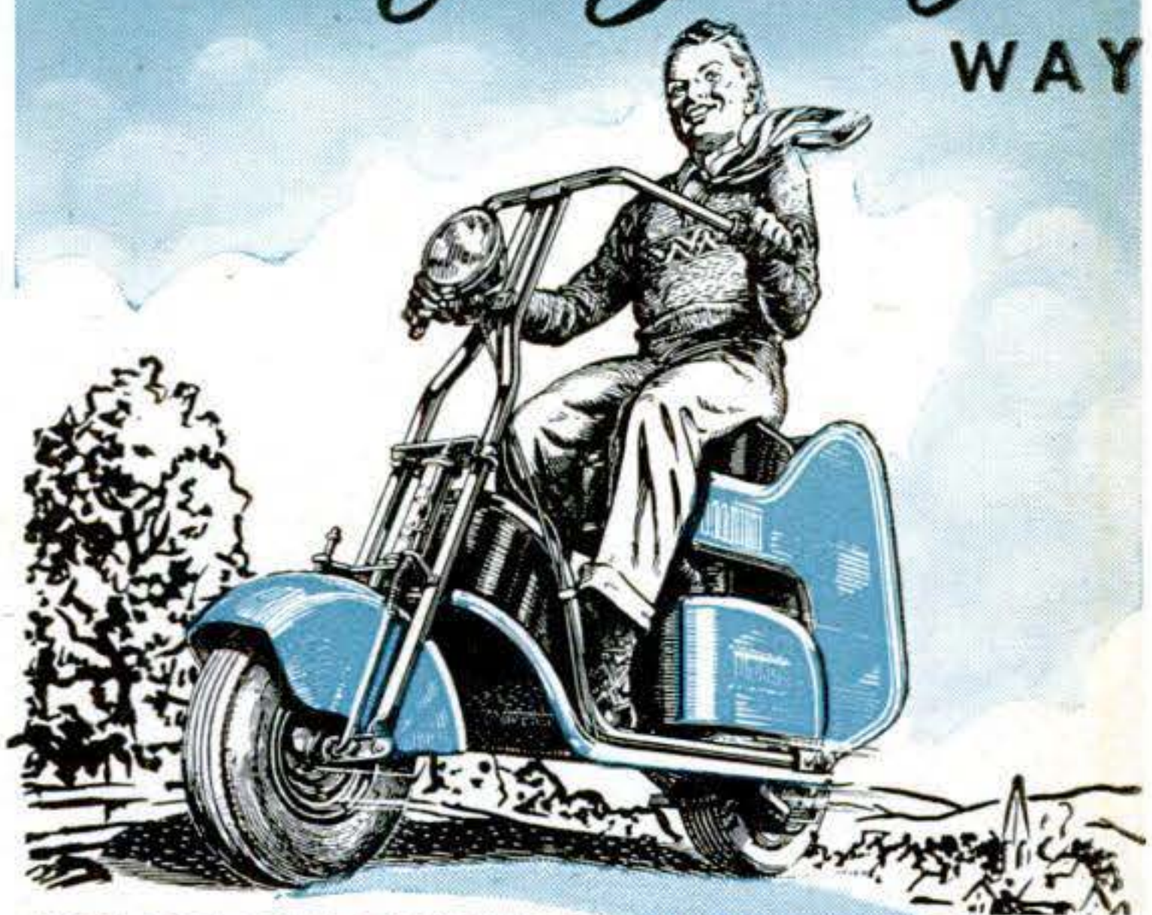
COUPON

FRANKLIN INSTITUTE
Dept. J117, Rochester 4, N. Y.
Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....
Address.....*Vet?*....

GO EVERYWHERE! PARK ANYWHERE!

THE AMERICAN Moto-Scoot WAY



MILES OF POWER FOR A PENNY

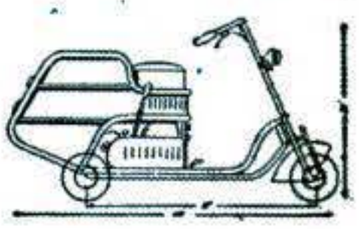
80 MILES TO THE GALLON
SPEEDS UP TO 40 M.P.H.

That's Traveling!

No wonder smart folks say AMERICAN Moto-Scoot is America's unbeatable power travel value for business and pleasure! Solves your every transportation problem—from carefree vacationing—to going to and from the job. Yes, it's swifter and *thriftier* to go the AMERICAN Moto-Scoot way!

See your dealer today or mail coupon for FREE Booklet.

Top Performance Low Upkeep



Precision Engineering & Construction

Have a "Spare Time" Income

AMERICAN Moto Scoot

Please send your free color Booklet. **PS-67**

Name_____

Address_____

City_____ County_____ State_____

Qualified Dealers Wanted—Write For Details
AMERICAN MOTO-SCOOT COMPANY
1305 W. CARROLL AVE., CHICAGO 7, ILL.

Copyrighted material

BARGAIN

Original Cost $150.00

3X Army Telescope

ALL COATED LENSES—BRAND NEW

An ideal gift for viewing objects, landscapes, seashores, etc. The high resolving power of the six coated lenses, five of them achromats will bring out great details. For the experimenter it can be dismantled and used for hundreds of projects. Length 22½ inches, 36° Field, **Postpaid $7.50.**

500,000 Lenses and Prisms. **Send 3 cent stamp for "BARGAIN" List.**

A. JAEGERS, **123-26B ROCKAWAY BLVD. SO. OZONE PARK 20, N. Y.**

Special Castolite Kit

Hobbyists, craftsmen: Get new CASTO-KIT containing everything to make useful objects with CASTOLITE, the new "magic" liquid casting plastic that pours without heat or pressure. Use crystal clear or color brilliantly. Make beautiful articles very first day—lamp bases, bookends, novelty jewelry. Also embed flowers, butterflies, photos, coins. Carve, saw or drill. Kit contains 1 lb. Liquid CASTOLITE, hardener, buffing compound, measuring dropper, abrasives, molding vial, flowers for embedding, Instruction Manual with easy step-by-step method. Big profit opportunities between now and Xmas. Send $3.35 for kit prepaid or order C.O.D. For illustrated Manual only, send 25c. **The CASTOLITE COMPANY, Dept. G-4, Box 211, Kenilworth, Ill.**

KUT RITE

LAWN MOWER SHARPENER

IT'S SAFE—QUICK—SIMPLE

Patented. 3 popular sizes. Retail prices: 14" $1.40; 16" $1.50; 18" $1.60. Mailing charges 25c.

ACCURATE SHARPENER MFG. CO.
Dept. PS2 Milwaukee 12, Wis.

How to Start YOUR OWN BUSINESS

Make Flexible Molds, Composition Flooring

NO EXPERIENCE—UNLIMITED MARKET

Start your own business at home in your spare time. Tremendous money-making opportunities for both **men** and **women.**

FLEXIBLE MOLDS

Make your own FLEXIBLE MOLDS. Cast novelties, statuary, desk sets, book ends, etc. Hundreds of casts made from single mold. Large size mold costs but a few cents. No experience necessary. Steady year-round demand.

COMPOSITION FLOORING

Make floors that last a lifetime with amazing COMPOSITION FLOORING! New discovery now enables you to lay artistic floors, in beautiful patterns in most colors and shades. Can be laid over wood, concrete, brick, steel, etc. This composition flooring offers unlimited money-making possibilities.

Free Catalog!

For FREE information about these and many other profitable business opportunities, WRITE TODAY!

BING PRODUCTS
Dept. B-20, 88 Broad Street Boston 10, Mass.

"JACKPOT"

Home Model COIN MACHINE

● Great fun maker for Rumpus Room or Club. Soon pays for itself. Fully automatic payout, three reels, with all the usual winning combinations . . . cherries, lemons, etc. Double jackpot. Rugged lifetime construction. *Guaranteed* to satisfy or money back. Service manual makes it easy to understand how to operate machine successfully. Takes space only 14½ x 11½ in. Ht. 18½ in. Shpg. wt. 47 lbs. CHOICE OF 5c, 10c, or 25c PLAY. Send $50.00 deposit, balance C.O.D. plus express charges. **Immediate delivery.....Each, $198.00**

***Webb* DISTRIBUTING CO. INC.**

6 SOUTH KEDZIE AVE. • CHICAGO 12, ILLINOIS

MASTER MACHINIST • MECHANICAL DRAFTING
TOOL-DIE DESIGNING • TOOL ENGINEERING

Completely equipped shops and drafting rooms, directed by an accredited staff of engineers and practical instructors. 18 years of successful training of men for industry.

Days, Evenings • Approved for Veteran Training

NEW CLASSES Now Forming • BULLETIN ON REQUEST

ALLIED SCHOOL OF MECHANICAL TRADES, INC.
44 ALLIED BLDG., 1336 S. MICHIGAN AVE. • CHICAGO 5, ILL.

HOW TO CUT RAFTERS

New vest pocket book gives lengths, Side cuts, Plumb cuts, Deductions. For all rafters for any building from one inch to forty feet wide. Gives numbers to cut on square. Also degrees for same cuts for Radial Saws. All standard pitches from ⅛ to ⅝. Just open book to pitch page and there are your lengths, side cuts, etc. Anyone who knows what a jack rafter is can frame a roof if he has this great book. Price one dollar prepaid. **Builders' Topics, Dept. S, Lock Box 828, Seattle, Washington.** Original teachers of the square in five easy lessons by mail. SEND FOR FREE LIST OF TECHNICAL BOOKS. Learn to read blueprints, etc.

THE GEM MAKER

Amateurs or professionals . . . hobbyists or jewelers . . . Polish your own gems with a B&I Gem Maker. You will find this a profitable adventure. All necessary lapidary equipment is furnished, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing, also complete instructions. The complete equipment as shown, less motor and belt, for only $29.50, f.o.b., Burlington, Wis. Write today for information and literature on the Gem Maker and accessories.
B&I MFG. CO., Dept. M, Burlington, Wis.

If Ruptured

Do What Others Now Do—

Wear a Form Fitting MILLER Truss

which provides natural freedom and comfort in working, walking, playing, horse back riding, dancing, swimming or sleeping. You just cannot afford to be without this protection and convenience.

Wear two weeks then consult your physician before deciding to keep it.

Write me today for **FREE** descriptive circular. Sent in plain, sealed envelope.

FRED B. MILLER Manufacturer
Dept. P.S. Hagerstown, Maryland.

Copyrighted material

x-acto*

HANDICRAFT KNIVES & TOOLS

Choice of experts in every art and craft field. Singly and in sets, 25c to $45.00.

Buy where you see this sign — At hobby, hardware and gift shops.

X-acto Crescent Products Co., Inc., N.Y.
In Canada, Handicraft Tools, Ltd., Toronto

*Reg. U.S. Pat. Off.

Now you can get
BETTER PICTURES
with less effort!

It's easy when you let the G-E exposure meter guide your camera. Gives you correct exposure in a jiffy.

No tricks to remember—simple to use. Amazingly accurate. Long-lasting life. Good for movies or stills. Gives benefit of ASA exposure-index numbers. Get the G-E meter and make *sure* of better pictures, especially in color. *General Electric, Schenectady 5, N.Y.*

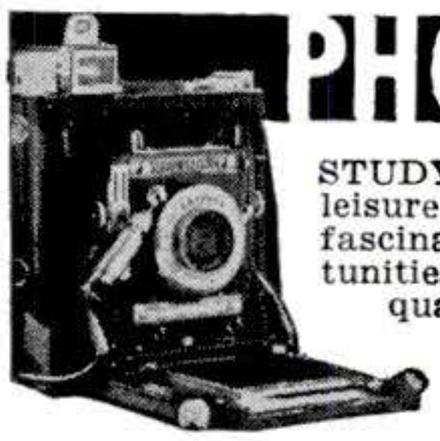
Ask your photo dealer for the

GE Exposure Meter

...it's 3 meters in one!

NEW ASA HOOD
Modernizes Type DW-48 and early DW-58 G-E meters. At photo dealers for only $5.50, Federal tax included.

GENERAL ELECTRIC
606-195F



PHOTOGRAPHY
for Fun or Profit

STUDY AT HOME. Photography offers leisure time enjoyment and well-paid, fascinating career. Ever-increasing opportunities! Success-proved N.Y.I. training qualifies you at home. Also resident courses. Details FREE!

NEW YORK INSTITUTE OF PHOTOGRAPHY
Dept. 5, 10 West 33 St., New York 1, N. Y., (37th Year)

Learn BAKING *At Home*

Baking is one of America's high industries in wages. Nearly depression-proof. Thorough basic home course lays sound foundation. If you have aptitude, write for FREE BOOKLET, "Opportunities in Commercial Baking."
National Baking School, 1315 Mich. Ave., Dept. 136A, Chicago 5

DRAW for MONEY!

Be An ARTIST!

Trained Artists are Capable of Earning $50, $60, $75 a Week

It's pleasant and interesting to study Art the W.S.A. way. **COMMERCIAL ART, DESIGNING, CARTOONING** all in ONE complete home study course. No previous Art experience necessary—hundreds have profited by our practical methods since 1914. TWO ART OUTFITS furnished. Full information in FREE BOOK, "Art for Pleasure and Profit." Write today.

Course available under "G.I." Bill

FREE BOOK gives details

WASHINGTON SCHOOL OF ART,
Studio 136H, 1115 15th St., N. W.
Washington 5, D. C.

Name ..... AGE.....
Street.....
City.....Zone ( ) State.....

No Waiting to LEARN

START NOW TO EARN!

This BIG BOOK SHOWS HOW

IF IT'S RESULTS YOU WANT—GET ACTION QUICKLY WITH THESE PRACTICAL IDEAS

Never before has a more helpful book been printed for those planning a business of their own. Gathered in this large illustrated volume are the formulas, recipes, facts and secrets that have contributed so largely to America's great industrial progress. Capitalize on this information for making most any conceivable product without experience, special equipment or previous knowledge of chemistry or manufacturing.

The experts who compiled this book are authorities, and present this information in simple, understandable language. They also give you wholesale supply sources for needed materials, short cuts and methods for the most profitable results.

START AT HOME—Expand out of profits.

Hundreds of good paying businesses have been built on a product made from a simple recipe. Choose from any of the 162,000 facts and 10,000 formulas of which the following are only a very few: Adhesives, Alloys, Anti-Freeze Solutions, Cosmetics, Beverages and Liquors, Candy, Gum, Casein, Celluloid, Ceramics, Cheese, Cleaning Preparations, Concrete, Copper, Cotton, Dentifrices, Depilatories, Dyes, Embalming Fluids, Enameling, Glass, Glazes, Household Formulas, Inks, Insecticides, Iron, Jewelers' Formulas, Lacquers, Laundry Preparations, Leather, Linoleum, Lubricants, Manicure Preparations, Marble (artificial), Metals, Mirrors, Oils and Ointments, Paints, Paper, Perfumes, Photography, Polishes, Powders, Remedies for Man, Beast or Fowl, Rubber Products, Refrigerants, Soaps, Solder and Soldering, Tooth Cements, Transfers, Transparencies, Varnishes and Thousands of others for making all sorts of profitable and practical things.

ALSO
We include Free—our new book of helpful money-making information:—"The More You Know the More You Can Earn—Easier and Quicker."

MANY FORTUNES MADE FROM A SINGLE IDEA!

This comprehensive book is an accepted authority by chemists, schools, industry, etc. and is the largest and most comprehensive book of its kind ever issued. Nothing else like it in existence. A single formula has been worth a thousand times this book's small cost to countless owners. Crammed with money-making ideas. Invaluable for reference. Ideal for Factory, Home, Farm, Office or Workshop. As necessary as the dictionary and more useful for manufacturers, chemists and salesmen who put up products for profit.

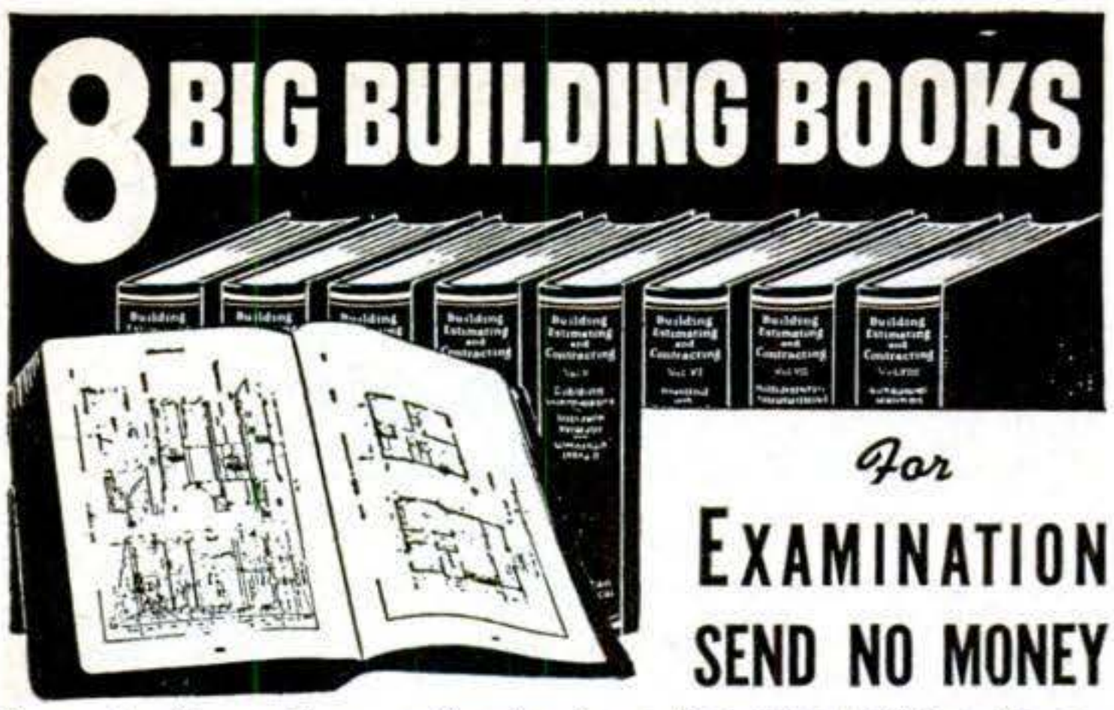
POSTPAID $3.98 ANYWHERE IN THE WORLD

$3.98 U. S. Funds. Postpaid anywhere in the world. (C.O.D. in U.S.A. only). Immediate shipment. Safe Delivery Guaranteed.

ADAMS BROWN COMPANY BOOKS OF APPLIED SCIENCE
Dept. 276 Chestnut Hill 67, Massachusetts, U. S. A.

Copyrighted material

8 BIG BUILDING BOOKS



For

EXAMINATION SEND NO MONEY

Learn to draw plans, estimate, be a live-wire builder, do remodeling, take contracting jobs. These 8 practical, profusely illustrated books cover subjects that will help you to get more work and make more money. Architectural design and drawing, estimating, steel square, roof framing, construction, painting and decorating, heating, air-conditioning, concrete forms and many other subjects are included.

BETTER JOBS — BETTER PAY

The postwar building boom is in full swing and trained men are needed. Big opportunities are always for MEN WHO KNOW HOW. These books supply quick, easily understood training and handy, permanent reference information that helps solve building problems.

UP-TO-DATE EDITION

These books are the most up-to-date and complete we have ever published on these many subjects.

Coupon Brings Eight Big Books For Examination

AMERICAN TECHNICAL SOCIETY Vocational Publishers since 1898
Dept. GA20 Drexel at 58th Street Chicago 37, Ill.

You may ship me the Up-to-Date edition of your eight big books, "Building, Estimating and Contracting," without any obligation to buy. I will pay the delivery charges only, and if fully satisfied in ten days, I will send you $2.00, and after that only $3.00 a month, until the total price of only $34.80 is paid. I am not obligated in any way unless I keep the books.

Name.....

Address.....

City.....State.....

Please attach a letter stating your age, occupation, employer's name and address, and name and address of at least one business man as a reference. Men in service, also please give home address.

Learn DRAFTING

Give Yourself a Chance to Make Good in this Big Opportunity Field

Don't be a fellow who "never had a chance" —for your big chance is right here now—in Drafting. The field for draftsmen is bigger now than ever before, for drafting is the basic profession and all new products start with the draftsman.

Get into Drafting now. I will train you at home, in your spare time and give you actual experience on actual work—the same kind of jobs you will do for the best paying firms. I will train you until you are competent, fully experienced and holding a position that will bring advancement and pay raises as deserved. Write me today!

EXPERIENCE WHILE LEARNING

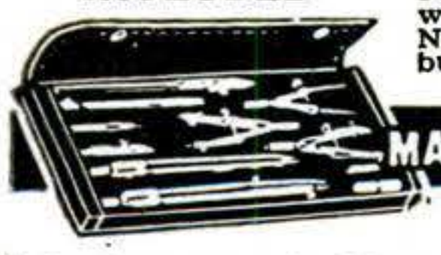
Don't forget! I train you through practical jobs—I give you experience. And I list this experience as a reference to employers when you are ready to go to work. Lack of starting knowledge or higher education should not hold you back. Low cost —and monthly payments, if desired.

ACT NOW!

Mail coupon to me today! No salesman will call, but you will get my big book and all details. Give your age to get reply.

WORKING TOOLS INCLUDED

You get drafting instruments, table and other equipment when you start. Nothing for you to buy.



MAIL COUPON FOR VITAL FACTS

Engineer Dobe, Div. 26, Libertyville, Ill.

Send me the Vital Facts on Drafting and Industrial Designing, your Free Book and advertised list of positions for Draftsmen and Designers wanted.

Name..... Age.....

Address.....

City..... Zone..... State.....

HOW to Make ART OBJECTS with RUBBER MOLDS

MOLDING MANUAL 10¢

Red Latex makes the Best RUBBER MOLDS

Mold makers: Get better results with special Francis Red Latex Molding Compound. Actually contains 64% concentration of rubber solids. Has all chemicals to yield best physical properties: high elasticity, freedom from permanent set, unusual elongation. Produces longer-lasting Molds. Gives better casts at lower cost. Illustrated instruction manual, explaining how to mold and produce valuable novelties and gifts, mailed for 10c (stamps or coin). Price list free. **FRANCIS SUPPLY COMPANY, Dept. G-3, 1836 East Fulton St., Columbus 9, Ohio.**

PLASTICS

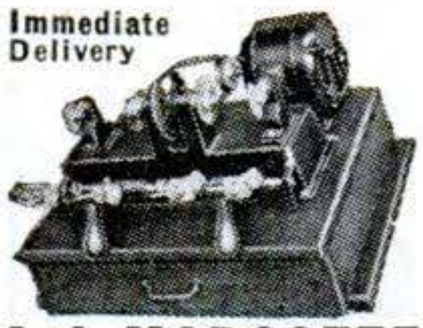
supplies for fabricating and casting, plans for plastic projects and plastic

Get started now in a profitable business or fascinating hobby. Write today for FREE list complete plastic plastic kits, complete accessories.

CENTURY ENTERPRISE
Box 56-PS, Station A Los Angeles 31, Calif.

MARCOT KEY MACHINE

Immediate Delivery



Marcot No. 8 Key Machine Mounted on Cabinet	$ 82.50
Book on Modern Locksmithing	3.95
Auto Code Book and Auto Depth Keys	12.50
162 Doz. Popular Key Blanks	77.76
Set Key Files, Tools, Pins, Springs, Thimble	10.50
	$187.21

A. J. MARCOTTE CO., 1200 N. KEDZIE AVE. DEPT. PS, CHICAGO 51, ILL.

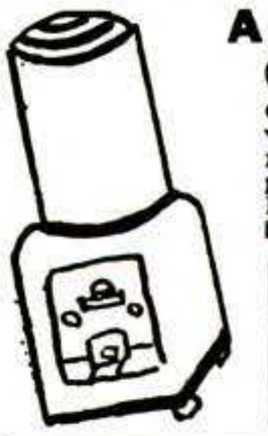
SAVING'S FUN WITH ELECTRONIC JUKE BOX BANK

The kids will love to save, and you'll thrill when this Electronic Juke Box glistens colorfully and lights on coin insertion. Here is the perfect gift for children and adults alike. Built of sturdy plastic and metal composition, this Electronic Bank makes friends of the entire family, and adds up to "money in the bank". Special Price to Dealers. Mail your order today.

ONLY $1.69

1/6 actual size

BERNARD FINE CO., 501 Sixth Avenue, N.Y. 17, N.Y. Dept. JB-2



A PENNY POSTCARD MAY CHANGE YOUR FUTURE...

Get full information on the coin-operated vending machine industry. Start with a few machines and build a wonderful future. We'll give you complete advantage of our "know-how." Send for Free Booklet Today—**No Routes Sold!**

PIONEER VENDING SERVICE
ADDRESS ALL MAIL TO DEPT. PS
461 SACKMAN ST. • BROOKLYN 12, N. Y.

VETERANS!

Be financially independent. New booklet describes changes in Loan Guaranty not generally understood, which provide not only opportunity for a home but also offer amazing possibilities for income and profit. For your copy mail $1.00 today.

H. B. Smith Box 747, Dept. P Youngstown, Ohio

FALSE TEETH

KLUTCH holds them tighter

KLUTCH forms a comfort cushion; holds dental plates so much firmer and snugger that one can eat and talk with greater comfort and security; in many cases almost **as well as with natural teeth.** Klutch lessens the constant fear of a dropping, rocking, chafing plate. 25c and 50c at druggists . . . If your druggist hasn't it, **don't waste money on substitutes,** but send us 10c and we will mail you a generous trial box. © I. P. INC.

KLUTCH CO., Box 4794-F, ELMIRA, N. Y.

Copyrighted material

FIREWORKS OH-BOY!

Banner has always been right there with the newest and best in fireworks. Now we offer you sensational new creations you never heard of before. Thrills galore. You'll be the envy of your friends and neighbors when you start celebrating with BANNER FIREWORKS . . . always rock bottom in price.

BIG SPECIAL DEAL—ONLY $4.95

Big giant assortment of over 150 pieces including Salutes, Roman Candles, Sky Screamers, Chinese Firecrackers, Sparklers, Vesuvius Fountains, Aerial Bombs and many others . . . regular $10.05, retail value for only $4.95. Rush your order. Supply limited. Catalog FREE.

BANNER FIREWORKS MFG. CO., INC., DEPT. 247
446 Capistrano Toledo 12, Ohio

AUTOMATIC-IRON TESTER (Pat. appl. for)

Pilot light flashes on and off with thermostat.

Invaluable for checking temperatures and accurately resetting thermostats. Registers in fabric graduations—Rayon, Silk, Wool, Cotton, Linen. Also in degrees, 200° to 700° F. Has a specially designed precision thermometer; unsurpassed in quality, accuracy and performance. ONLY $18.50 postpaid. MONEY BACK GUARANTEE. Write for circular.

HANLAN CO., 1419-B, West Jefferson, Los Angeles 7, Calif.

ATTENTION AUTO OWNERS!

New Power, Pickup, Pep!

Amazing TYPHOON SUPER-CHARGER is back again, ready to put new life into old motors, add to power, pickup, pep. 41,000 users find gasoline economy, you will, too. Motor knock vanishes . . . Grease bath air cleaning keeps dust out. Takes 5 minutes to install with screw driver, fits on carburetor. Order today, mention make and car model. Only $5.95. Ohio orders add 3% tax, west of Rockies add 10%.

10 DAY MONEY BACK GUARANTEE!

TYPHOON PRODUCTS CO. 509-L Engineers Bldg., Cleveland 14, Ohio

LEARN MASONRY

Get in on the biggest building boom in history. Prepare for a long and profitable career as a big-pay building tradesman. Actual shop training under expert instructors. Write for big free catalog today.

MIDWEST SCHOOL OF BUILDING TRADES
Dept. M26, 411 N. Center Street, Bloomington, Ill.

Free FACTS

VETERANS ASK FOR GI PLAN

Personalized Playing Cards

EACH CARD GOLD STAMPED WITH YOUR NAME OR INITIALS

$1.00 Per Deck

or 6 Decks $5.00
Postpaid

Here is a new idea in games and gifts—your name or initials gold-stamped on each card of the deck—to give it that PERSONAL TOUCH! Each deck attractively boxed and mailed to you promptly upon receipt of order.

Write for free bulletin of personalized gifts
ORDER TODAY! (Limit name to 20 letters)
HERBERT CO., 143 Am. Red Cross Bldg., Detroit 1, Mich.

Powerful Light Anywhere—Any Time with Big Beam

Model No. 211

Portable Electric Hand Lamp

Uses Standard Dry Cell Batteries

1500-Foot Beam; Spread Light Control; Hundreds of Sports, Utility or Emergency Uses. Here is the powerful, dependable, portable light everyone's talking about—indispensable for Farmers, Home Owners and Motorists, ideal for Yachting, Hunting, Fishing, Camping and all outdoor uses. Daylight visibility when and where you need it. Built to last for years. *Also* . . . other dry cell and storage battery models for police and fire departments, marine, railroad, airport and other industrial uses. Many accessories available—such as colored lens, hold-down bracket for rigid fastening in auto trunks, to prows of boats, etc.

Available Through Better Dealers—or Mail Coupon Today for Complete Descriptive Information.

Canadian Representative—Walters & Marks, Toronto 5.

U-C LITE MANUFACTURING CO.
1046 W. Hubbard Street, Chicago 22, Ill.

Please send me without obligation complete information on the following:
☐ BIG BEAM MODEL No. 211 ☐ OTHER MODELS

Name_____
Street No._____
City_____ Zone____ State____

AT LAST! A HOBBY THAT OFFERS YOU PROFIT AS WELL AS PLEASURE!

GENUINE LEATHER
Hand Crafted
LINK BELT
Easy to Make—Easy to Sell

Get started today on a fascinating hobby where you can earn up to $10 or $15 a week in spare time! Send for your complete profit-producing Handicraft Kit with all the material needed to make 6 genuine leather link belts. Sell all you make at $2 each to people expecting to pay far more for genuine hand-made belts. Kit for 6 belts costs *you* only $3.50—can easily be sold for $12—leaving you a profit of $8.50. Send $3.50 for your Kit today, or mail only a dollar for sample Kit! Or C.O.D., you pay postage. Money back if not delighted.

FREE WITH YOUR ORDER

. . . IF YOU ACT NOW!

Beautiful Plastic Card Case, value 25c, free with $1 kit. Yours to keep, even if you return belt kit. **Also, on request, big new 40-page CRAFT CATALOG FREE with or without order.**

DWINNELL CRAFT SHOP, Dept. SC-76, Elm Grove, Wheeling, W. Va.

3 NEW PLASTICS MANUALS

FABRICATING • CARVING • CASTING PLASTICS

Make gorgeous gift and novelty objects of Plexiglas, Lucite, Polystyrene, Catalin and Castolite at home. Jewelry, ornaments, lamp bases, picture frames, other accessories. Have fascinating hobby and build very profitable spare time or full time business. Send for new Manuals on Fabricating, Carving and Casting. Show you how to weld, form, fabricate, carve and cast latest plastic materials in home work shop. See HOW—then we can supply all kinds of latest plastics materials (including special new liquid plastic) and kit of famous HANDEE grinding tools. These new Manuals include hundreds of practical suggestions, ideas and facts showing how to succeed. Price for all three manuals prepaid, $1.00. Or get circular and price list Free. Write today!

HOUSE BEAUTIFUL PLASTICS, Dept. G-4
5534 W. Harrison St., Chicago 44, Illinois

Copyrighted material

Solves Both the Travel and the Housing Problem

The Palace Travel Coach! A luxurious home to take with you when traveling—or to live in until houses again become plentiful. Has combination living room, dinette and kitchen, and separate bedroom—all completely furnished. Efficient air and heat circulation. "Uniflow" lighting and a host of other unusual features.

The Only Trailer With An Automobile-type Body

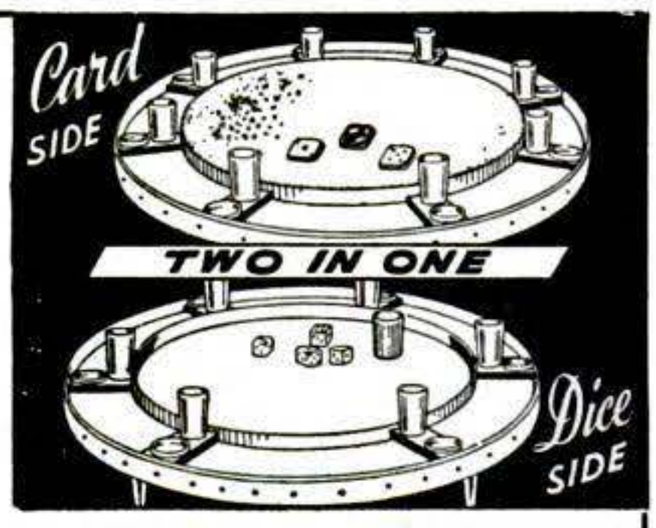
It has a die-formed, "Pan-L-Frame," aluminum body—an exclusive Palace feature, resulting in increased durability and, at the same time, reduced weight. It's the trailer, above all others, that you will want to own. Moderately priced. Send postcard for literature showing exterior and interior in colors.

FREE Catalog

PALACE CORPORATION
Flint, Michigan

SAVE $30 to $40

Build it yourself



LANE CARD DICE TABLE—Send $1 today

for photographs and bill of material showing how to build this clever new model card and dice table . . . to . . .

GEORGE H. LANE, Edgewood 2, Md.

MAKE BIG MONEY AT HOME

Preserving baby shoes in metal, pearl, gold, silver, bronze. No experience necessary 500%-1000% profit. Your own business.
KIKTAVI CO., 8620 So. Ruthelen, Los Angeles 44, Calif.

TaVEL'S JEWELRY CO. 4 West Market Street Indianapolis 4, Indiana

Please send me ☐ 5 POWER Spy Glasses with Case at $1.25 for both postpaid. No C.O.D.
NAME.....
ADDRESS.....
Merchandise fully guaranteed — ☐ M O ☐ Check

A.C.-D.C. Converter Kit

NOW ONLY $9.95 PLUS POSTAGE

Every workshop needs this direct current unit for home plating, battery-boosting, operation small D.C. motors, models. Here is the best value ever offered. Consists of fully enclosed heavy-duty transformer, genuine selenium rectifier, handsome black cabinet, all parts needed to build this powerful 6 volt 4 ampere converter in less than 30 minutes. Full instructions for assembly and use included. Plugs into 110 V A.C. and delivers 6 volts, 4 amperes, D.C. Also available for 12 volts, 4 amps D.C. at $17.50 and 14 volts 8 amps D.C. at $22.50. Excellent for operating War Surplus D.C. radios and motors. Enclose money order or check when ordering. Shipping Weight 10 lbs.

SCINTILLA RAIL AND POWER WORKS
54 Macdougal Street New York 12, N. Y.

BRASS NAME TAGS

STAMPED WITH YOUR NAME, STREET, CITY & PHONE!

YOUR NAME STREET CITY PHONE

FREE LINKS FOR ATTACHING!

High Quality Brass tags, for luggage, keys, tool box, fishing tackle, identification. Free links for attaching. 25c each, 5 for $1, 12 for $2. (All same or different). AGENTS WANTED!

ARTCO Dept. 101-F, P. O. Box 1594 St. Louis 1, Mo.

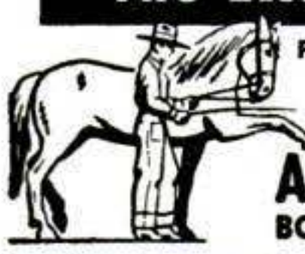
25¢ 5 for $1 12 for $2

HORSE MASTERY!

A FINE HOBBY — A GREAT VOCATION!

"The EXPERT HORSEMAN"

SUBSCRIBE TODAY 50¢ One Year



FREE BOOK — Tells how You can learn to: BREAK COLTS, GAIT SHOW HORSES, TRAIN RODEO, STOCK and RACE HORSES, BREAK BAD HABITS, HANDLE ANY HORSE. TRAIN CIRCUS TRICK HORSES. WRITE TODAY!

ANIMAL LOVERS ASSOCIATION
BOX S-157 TARZANA, CALIFORNIA

NEW HELP FOR RUPTURE!

is the amazing Treatise which explains simple, easy, proven way for curbing your rupture permanently. Right at home; without costing you a cent. This proven way has helped thousands of rupture sufferers quickly. So don't let your rupture get worse. Send for FREE details today. Mailed to you in plain sealed envelope. No obligation.

BRADNER PUBLISHING CO. (Established 1933) Box 332G Dixon, Ill.

HILARIOUS FUN AT HOME

SING TALK PLAY THROUGH YOUR OWN RADIO

Cut in on any program. Mystify, amuse your friends. They hear but can't see you. Professional type microphone. Used for serious practice. Attaches easily to any radio. Complete with cord and instructions. SEND NO MONEY. Pay postman $1.88 plus postage. To save postage send check or money order.

REGAL CO., Dept. PS7, 345 E. 47th St., Chicago 15, Ill.

BECOME A MANUFACTURER'S AGENT

Be your own boss and earn big profits with little or no capital investment. Send today for the VIMAR PLAN which provides you in detail with soundly-tested methods on how to become a representative for prominent manufacturers. Learn how to contact concerns, select products and build a successful business for yourself. $2.00 postpaid.

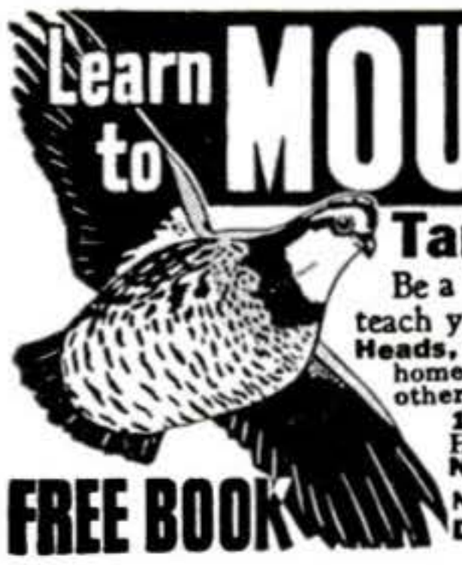
VIMAR CO. 210 LOEB ARCADE, Dept. A-22 MINNEAPOLIS 2, MINN.

A Penny May Bring You HAPPINESS!

Would you gamble a penny to win Happiness, Companionship, Love, Financial Success, through the help of a mysterious International Secret Organization? Then just send name and address on a post-card TODAY for your FREE Copy of great Book "Mayan Mysteries". It can change your whole life! **Address Rose Dawn, The Mayan Order, Dep't. 767, P.O. Box 2710, San Antonio, Tex.**

Copyrighted material

Learn to MOUNT BIRDS



Tan SKINS, make up FURS

Be a Taxidermist. *Double your hunting fun.* We teach you **at Home.** Mount **Birds, Animals, Fish, Heads,** common specimens. **Fun and profits.** Decorate home and den **MAKE MONEY.** Mount game, tan for others. Big profits in spare time. **WRITE TODAY.**

100 game pictures in FREE BOOK
Hunters, get your copy. It's **Now Free.** Send post card. State your **AGE.**

FREE BOOK

NORTHWESTERN SCHOOL OF TAXIDERMY
Dept. 339A **Omaha, Nebraska**

YOU Can Get This 2H.P. MOTOR SCOOTER!

AS LOW AS $29.95

Assemble or build it—it's easy! We can furnish factory built parts. 2 speeds up to 45 MPH! 100 M.P. gal. Easy riding—knee action and low gravity spring frame. Large 12" tires. *Streamlined.*

SEND ONLY $1.00 (cash or money order postpaid) (or pay postman $1.52 C.O.D. in U.S. only) for complete scale isometric picture blueprints (anyone can read them), 8 pages photo details, lists of factory parts prices for *both electric and gas models!*

FREE with each order—big 48 page color book giving full details on over 100 other new inventions such as JET ENGINES—MIDGET MOTORCYCLES—ELECTRIC WELDERS—MOTORS—MIDGET CARS—BIKE MOTORS AND SIDECARS—MIDGET GARDEN TRACTORS. SAVE HUNDREDS OF DOLLARS WITH THESE PLANS! (Foreign orders $1.50)

MOTOR INDUSTRIES INC. Dept. PS-6 KEARNEY, NEBRASKA

Be Your Own Boss — In Your Own Business

Start at home . . . small capital needed . . . prepare for exciting plastics jobs or Your Own Plastics Business. We teach you Fabrication and Casting right in your own home. All materials furnished. Send ad with name and address for information.

VETERANS: Eligible for resident training under G. I. bill, Check here ☐

LEARN

PLASTICS

PLASTICS TECH
School *of* America, *Inc.*
5200 Euclid Avenue
Dept. S-6
Cleveland 3, Ohio

Opportunity Knocks

With TRADIO . . . the radio FUNCTIONALLY DESIGNED for coin operation in Hotels, Motels, Stopovers, Clubs, Hospitals, Stations, Etc. Big Earnings . . . Steady Income . . . No Clock To Punch . . . Full Or Part Time!

● **QUANTITY DELIVERIES DAILY . . . ONLY SMALL INVESTMENT**
Grow With A Young Industry! Get In On The Ground Floor and Be Independent For Life. It's Easy!

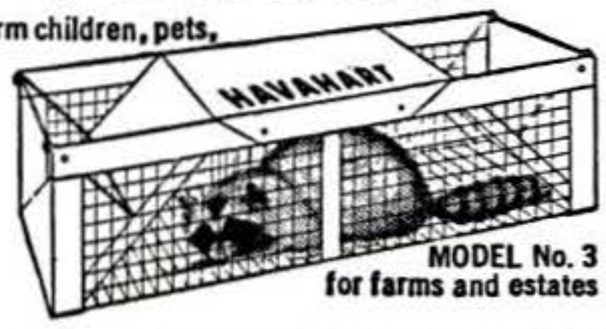
Send for Complete Information TODAY . . . No Routes Sold

WRITE TO TRADIO, INC., DEPT. PS ASBURY PARK, N. J., Right Now!

CATCH 'EM ALIVE AND UNHURT!

Amazing new trap can't harm children, pets, birds or poultry. Simple to set. Rustproof. No springs. Send 10c today for 24 page booklet on trapping with free price list. Write

HAVAHART,
477 Water Street
Ossining, N.Y.



MODEL No. 3
for farms and estates

BOATS for *Home Assembly*

"U-MAK-IT"

KAYAKS, ROWBOATS, DINGHIES, INBOARDS, OUTBOARDS, RUNABOUTS

Cut-To-Fit for Quick Assembly. Everything Complete plus Illustrated Instructions. No Experience Necessary. Simple as A. B. C.

25¢ COIN FOR ALL THREE

SEND 25c POSTAGE (COIN) TODAY
FOR 3 MONEY SAVING ILLUS. CATALOGS
Showing all '47 Models (marine plywood) and construction details.

AQUAMOBILE V-18

Designed for Auto Engines. Open or with cab. Length 18 ft.
Fast VEE Bottom Hull.

KAYAK BOAT CO., 152R EAST 129th ST., NEW YORK 35, N. Y.

WAR SURPLUS *Close Outs*

ARMY TRUNKS: Made of durable Plywood with extra tray, real value (used) **$3.98**
METAL BOXES: Extra heavy gauge, well built 14x17x23". Fine for tool box, storage, etc. (used) **$1.98**
METAL CHEST: (new) 12½x18½x9½", with 4 liftout trays, perfect as strong box for valuable papers, jewelry, etc., $12.00 value **$5.95**
WHEEL CHAIRS: New, genuine GENDRON, bargain . . . **$24.50**
ROPE: New ½" Government specifications, (longer lengths available) 100 feet **$2.75**
SCREW JACKS: Bell Bottom, 12 ton capacity (used) . . **$5.49**
GRINDERS & BUFFERS: Bench Size (New) ½" shaft, less wheels, $2.20 value **$1.69**
ELEC. DRILLS: (used) with ¼" Jacobs Chuck, tested, in excellent working condition, $40.00 value **$17.95**
WIRE BUFFING WHEELS: Genuine Osbornes 10" (used) good condition. State shaft size desired. $2.20 value **$1.19**
WHEELS: Ball bearing with tire & tube, 10" High (used—like new) . . . . . Each **$4.50**
STEEL WHEELS: Ball bearing, 10" high (used) . . Each **$1.98**
DRILL BITS: Hi-Speed, (used—good condition) assortment up to ¼" . . . . . doz. **$2.98**, ¼ to ⅜" . . . . . doz. **$3.98**
TAPE: (Mystik-Adhesive cloth back) For all purposes, 60 yd. rolls, 4" wide, per roll **$1.19**

AIR or LIQUID TANKS

Airplane oxygen tanks (used) good condition, holds up to 400 lbs. pressure: non-rusting stainless steel, weighs 18 lbs., 10½ gal. capacity, 24" long x 12" diam., **$4.98.** Same specifications 24" long x 6" diam., weighs 5 lbs., 3 gal. capacity, **$2.98.** Ends tapped for ⅜" standard pipe thread. Ideal for compressed air tanks, any bottled gas, or liquids, water supply for house trailers, compressors, floating rafts, buoys, net floats, airhorns, air brakes, etc. Air check-valve to fit tanks, $5.00 value **98c**

Prices FOB, Kansas City — No COD orders

MIDWEST BUY ANYTHING CO.
1520 Locust St. **Kansas City, Mo.**

METAL FORMING TOOLS

VISE IRON BENDER. Easily bends ½" square or round: ¼" up to 2" wide. Makes hooks, rings, hoops, eyelets, etc. Screw adjustment for accurate work. Interchangeable parts. All steel. Price $10.00 PP. Immediate delivery.
VISE FORMING TOOL. Makes cylinders, ovals, cones and round corners in sheet metal, wire and ⅛x2 steel strap, 2" to 60" in dia., 18" wide. $8.50 PP.
12" BRAKE. Fits in vise, or clamps to bench. Forms angles, channels, boxes and crimps in sheet metal and strap iron, $14.50 PP.
Order direct, or send for details. **Sheet Metal and Wire Forming, booklet, 50c.**

VISE BRAKE MFG. CO., P, 1318 So. 30th Ave., Omaha 5, Nebr.

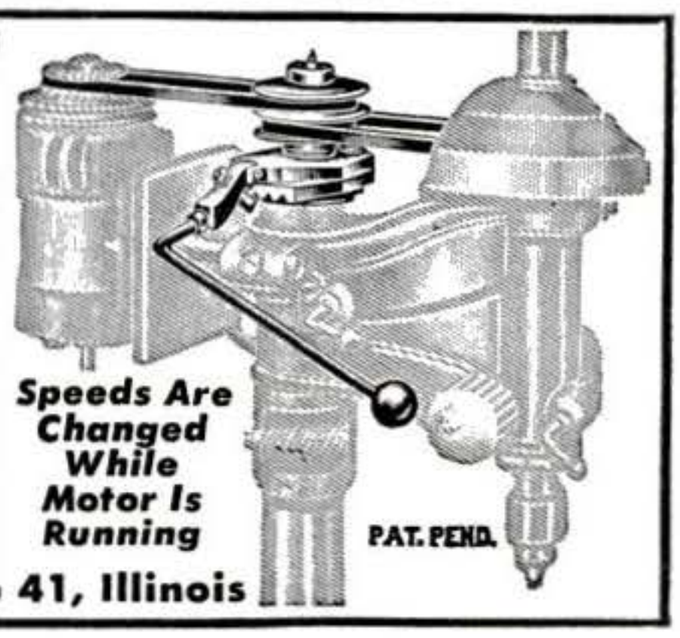
VARIABLE SPEED DRIVE ATTACHMENT

The Era Variable Speed Drive provides correct speeds for large or small drills by a convenient method of shifting a lever.
Fits all popular makes of drill presses. Installed in a few minutes, without drilling of holes.

SPEED RANGES AVAILABLE WITH STANDARD DRIVES

	Min./Max.		Min./Max.
Atlas 53, Sears 101.035	310/10,000	Buffalo 18	250/ 4,600
Atlas 63, Sears 101.036	310/10,000	Delta 17 L.S. Old Mod.	300/ 2,850
Boice Crane 1600	260/10,000	Delta 17 H.S. Old Mod.	600/ 5,500
Buffalo 15	290/ 9,800	Delta 17 L.S. New Mod.	215/ 4,300
Canedy-Otto 16 Royal	390/ 9,700	Delta 17 H.S. New Mod.	430/ 8,300
Delta 14 L. Speed	310/ 2,280	Walker Turner D-1100 L.S.	160/ 3,300
Delta 14 H. Speed	580/ 5,300	Walker Turner D-1100 H.S.	236/ 5,000
Duro 14, M. Ward H. Duty	350/ 9,000	Price Any Above: Bronze Bearing Mod.	**$45.00**
Walker Turner 900 L.S.	360/ 3,100	Price Any Above: Ball Bear. Mod.	**$51.00**
Walker Turner 900 H.S.	670/ 5,500	Special High Range Drive For	
Price Any Above: Light Duty Mod.	**$27.50**	Delta 14 L.S. Press	235/ 3,850
Price Any Above: Bronze Bear. Mod.	**$39.50**	Delta 14 H.S. Press	350/ 9,000
Price Any Above: Ball Bearing Mod.	**$45.50**	L. Duty **$35.00**, Std. **$45.00**, Ball Bear. **$51.00**	

Shipped Complete Including Belts **Prices F.O.B. Factory**



***Order direct from* ERA METER CO., 3938 North Kilpatrick Avenue, Chicago 41, Illinois**

Copyrighted material

PERFECT DOWELS
. . . easily made

ON YOUR LATHE OR DRILL PRESS
Use a SPEE-DOWL and you can work wonders with wood. Quickly and easily you'll make dowels of any wood . . . perfect burnished dowels for furniture, toys and thousands of other projects. You merely push SPEE-DOWL on wood—the lathe or drill press does the work! Cast body, tool steel blade. SIZES: 2, 3, 4, 5, 6, 7 and 8/16" (illustrated at left). Only $1. ea. Special —any 4 of above for $3.50: complete set of 7 for $6. Also individual sizes 9 to 20/16" (illustrated at right) $2.65 each. SPEE-DOWL is Unconditionally Guaranteed. Send postal note or check—we pay postage in North America.

Send for **FREE LITERATURE**

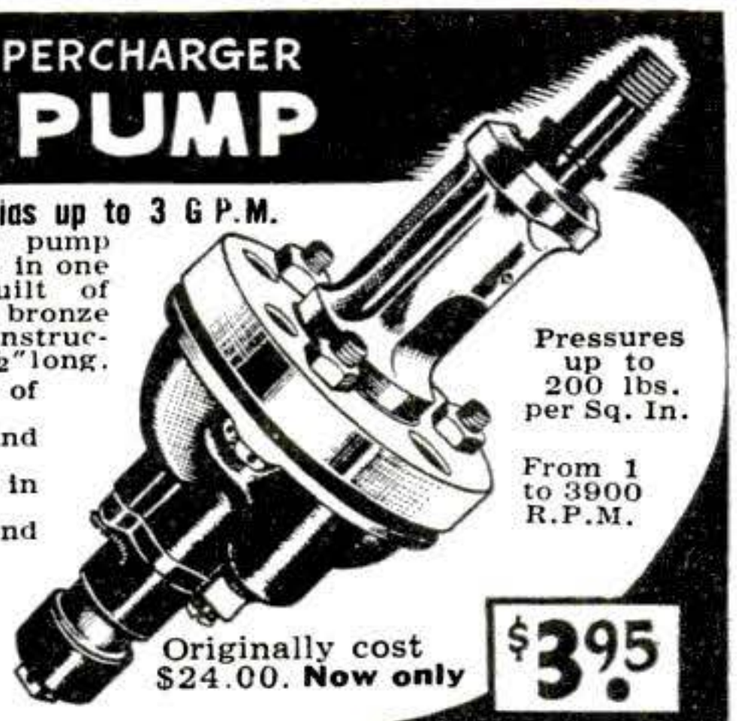
JOHNS MFG. CORP., DEPT. B-9
DUNELLEN, N. J.

AIRCRAFT SUPERCHARGER
LUBE PUMP

Designed for pumping liquids up to 3 G.P.M.
A gear type impeller pump with two pumping units in one housing. Precision built of aluminum, cast iron, bronze and steel. Compact construction—only 3½" Dia. x 8½" long.

- Vacuum, 29½ inches of mercury.
- ½" Dia. Threaded and keyed shaft.
- Brand new! Sealed in Pliofilm.
- With Test Sheet and Instructions.

Immediate delivery. Order now! Post paid anywhere in U.S.A. upon receipt of check or M. O. C.O.D. orders include postage and extra fees.



Pressures up to 200 lbs. per Sq. In.

From 1 to 3900 R.P.M.

Originally cost $24.00. **Now only** **$3.95**

FISCHER LABS 1729 N. MOBILE, CHICAGO, 39, ILL.

BALL $1.00 PEN

HERE IT IS! BEAUTIFUL! HIGHLY POLISHED.

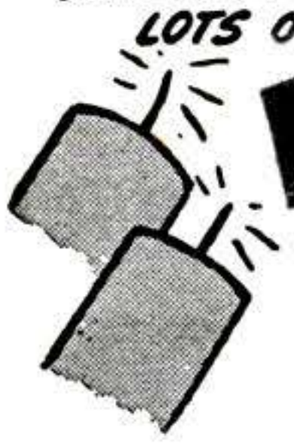
HERE IT IS! FINE QUALITY. WRITES DRY!

Makes many carbon copies. Ideal for office; schoolroom; gift. Sent prepaid. Send M. O. or check — As many as you like!

'BEACON' 649 Anderson Ave., Cliffside, New Jersey

SENSATIONAL BARGAIN OFFER!
LOTS OF NOISE AND BEAUTY

FIREWORKS



Here they are! Big combination assortment! Plenty of "Bang" for the day . . . gorgeous, vari-colored display for after-dark thrills! Giant Salutes . . . Whistling Chasing Bombs. . . Flare Bombs . . . Roman Candles, Flitter Bombs and many other noise and beauty pieces! **$4.98**

$9.95 VALUE FOR ONLY

Think of it! Giant assortment . . . 241 pieces for phenomenal low price of $4.98! You save 50%!

OTHER AMAZING BARGAINS! WRITE TODAY! FREE CATALOG

F.O.B. FT. WORTH. NO C.O.D. SALES. WRITE Dept.-F1

STARS & STRIPES FIREWORKS CO. Box 6206 Ft. Worth, Tex.

U. S. GOV'T SURPLUS

ALL WEATHER HAMMOCKS
BRAND NEW

Weatherproof Roof. Mosquito Netting with 50" Zipper. Waterproof. Mildew proof. Made completely of NYLON with NYLON Ropes and Rings for Hanging. Folds compactly.

$4.98 Add 45c Postage
Value $30.00

New U.S. Air Corps Plastic Canteen	98c
New 100% Virgin Wool Sleeping Bag	$6.95
Pup Tents New $5.95—Slightly Used	$2.98
New U.S. Gov't Watch Type Jeweled Compass—Longines—Waltham	98c
New Hunting Knife & Sheath 6" polished Blade	$1.98

Send Check or Money Order — Send 10c for 48 Page Catalog

NATIONAL SURPLUS SALES 140 Dean St. Brooklyn 17, N. Y.

---

16 oz. Container **$1.25**

PLASTIC GLOSS

FOR YOUR CAR
FAST ACTION

- LAY IT ON
- WIPE IT OFF

★ *Cleans* ★ *Protects*
★ *Polishes* ★ *Lasts Longer*

AT YOUR SERVICE STATION OR AUTOMOBILE SUPPLY DEALER

PLASTIC FINISH CO., DEPT. P. S. *BUFFALO 2, N. Y.*

ELECTRIC WELDER

AC or DC 110 Volts

Pre-war type—All metal—No chemical—5 year written guarantee. Welds ⅛" thick metal or money back. Repairs tanks, tools, fenders, machine parts, etc. Comes complete with rods, unit directions and eye shield. We also manufacture a set you can learn with for only $3.95 complete. On C.O.D. mailing charges extra.

$6.45 Complete

ESSAY MFG. CO., INC., Dept. P.S., Quincy 69, Mass.

COMB-A-TRIM

The New Quick Trimmer

Something New! Trim your hair without any experience. It's easy! The excess hair comes off smoothly and easily by just pulling trimmer through hair like an ordinary comb. Save on hair-cut bills. . . . Trim your own hair or the whole family's. Send 59c and your Comb-A-Trim will be sent at once, postpaid.

59c

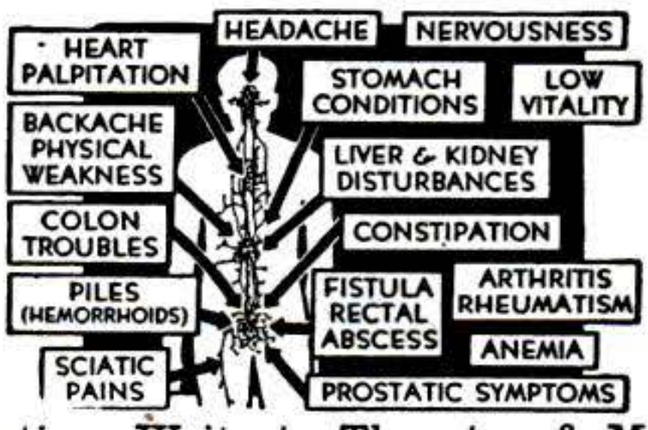
SPECIAL OFFER Send $1.00 for 2 Comb-A-Trims. Save 18c **2 for $1**

5 Extra Blades (Year's Supply) **25c**

COMB-A-TRIM CO., CAREW TOWER, Dept. J-20, Cincinnati, Ohio

Piles May Lead to Chronic Ailments

FREE BOOK—Explains the Causes and Effects



No obligation. Write to Thornton & Minor Clinic, Suite 649, 926 McGee St., Kansas City, Mo.

Copyrighted material

REPAIRMEN

ELEC. APPLIANCES

MONEY SAVING PRICES—IMMEDIATE DELIVERY

RENUALL Iron element. Guar. 1 year. Package of 6	$3.12
Toaster element forms. Clear Mica. Fits most toasters. 10 for	1.80
Heating element wire 10 ft. coiled 3/16" O.D. #22	1.77
Christy Electric Heating Element Welding Flux for repairing Flat Irons, toasters, electric stoves, etc. Enough for 50 elements	1.00
Rubber Grommets—Assorted sizes. Kit of 100	1.30
Motor Insulating varnish. 1 Pint	1.00
Hot plate bricks 5-¾" diameter. 6 for	1.62
Electricians Drill Bits ¼", ⅜", ½", ¾" Complete set	6.75
Ribbon element heating wire. Std. size. 100 ft.	.75
Percolator elements. Universal Flat type. 1 Yr. guar. 2 for	1.20
Element cement. Withstand 3000° F. 1 lb. package	1.00
Lead wire. Asbestos covered heater hook-up wire. 10 ft.	1.00
Carbon brush set. Assorted. 104 brushes, 15 springs. Complete	3.00
Kerosene to Electric lamp conversion adapters. 5 for only	1.00
Nickel Electroplating Kit. Complete outfit. Ready to use	1.50
Electric Scissor Sharpener. Will handle all sizes. Complete	9.75

Here is your opportunity to save on repairing your own appliances and to earn extra money repairing appliances for friends and neighbors.

CHRISTY SUPPLY COMPANY

2835 N. Central Ave., Dept. T-851, Chicago 34, Illinois

LEARN MEAT CUTTING At Home—In Spare Time

Get into the vital meat industry. Concise, practical Home Training based on 25 years proven instruction methods used at National's famous resident school. Prepares you for bigger pay as Meat Cutter, supervision, market manager or more money in your own store. Go as rapidly as your spare time permits. Diploma. Start NOW to turn your spare hours into money. Send for FREE bulletin today. No obligation.

National School of Meat Cutting Inc., Dept. O-55, Toledo 4, Ohio

BIG MONEY IN YOUR OWN BUSINESS

• Amazing, scientifically developed LIQUID IMITATION MARBLE, FIBER-TITE, FLOORING, FLEXIBLE MOLDS brings you a fast money making opportunity. Work full or spare time and make big profits. Experience unnecessary. No large investment required. Work from your home. Write for FREE CATALOG and full details.

COMPOSITION PRODUCTS CO. Dept. PS-6, 5853 Delmar St. Louis 12, Mo.

CONCRETE BLOCK HOMES

A practical booklet on how to build them. 24 pages illustrated with "easy to read" drawings $1.00

H. C. LIGHTFOOT—CIVIL ENGINEER
RICHBORO, BUCKS CO., PENNA.

LEARN *to REPAIR and SERVICE*

Electrical Appliances, sewing machines, motors, bicycles, lawn mowers, saw filing, cutlery grinding etc.

Start with $20.00 and a few common tools. Build low cost equipment while earning. Make up to $6.00 an hour! Free details. Complete, illustrated course only..... **$5.50**

REPAIRMAN'S SERVICE, 222 4th Ave., Janesville, Wis.

BOILING HOT WATER IN A JIFFY!!

Place the Jiffy Electric Water Heater into the water and insert the plug in the nearest electric wall or light plug. You will have hot water in less than five minutes for baby's bath, your washing, shaving and a great many other uses in the home, camping, business, and on the farm. Mailed complete, including six feet of rubber covered wires and plug. One year guarantee.

JIFFY ELECTRIC COMPANY
21322 Stephenson Highway, Dept. PS-3, Hazel Park, Mich.

Only **$2.95**
plus twenty five cents for postage

NOW! The ONE-UNIT HEARING AID

Thousands Have Waited for

THIS IS ALL YOU WEAR

No Separate Battery Pack
No Dangling Battery Cords

ACCEPTED COUNCIL ON PHYSICAL MEDICINE AMERICAN MEDICAL ASSOCIATION

The tiny new BELTONE Mono-Pac is about ⅓ size and weight of old-style hearing aids, yet so powerful you hear even *whispers!* Get helpful facts about this new "MIRACLE" aid in valuable FREE book about deafness.

REPLACEMENT OR REFUND OF MONEY — Guaranteed by Good Housekeeping — IF NOT AS ADVERTISED THEREIN

BELTONE HEARING AID CO.
1450 W. 19th St., Dept. PS-76, Chicago 8, Ill.

FREE BOOKLET

Beltone Hearing Aid Co.
Dept. PS-76, 1450 W. 19th St., Chicago 8, Ill.

Please send me FREE booklet about deafness and what can be done to overcome it.

*Name*_____

*Address*_____

*Town*_____ *Zone*____ *State*_____

U.S. GOVERNMENT JOBS

START $1,756 TO $3,021 YEAR

Men—Women
Prepare NOW for next Examinations
Vets Get Preference
Mail Coupon today sure

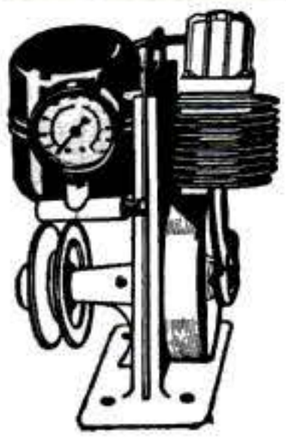
COUPON

FRANKLIN INSTITUTE
Dept. J82 Rochester 4, N. Y.

Sirs: Rush without charge (1) 32-page Civil Service book with list of U. S. Government Jobs. (2) Tell me how to prepare for one.

Name.....

Address.....*Vet?*....



COMPRESSED AIR INSTANTLY, Anywhere!!

Portable Air Compressor and storage tank. Ruggedly built of best materials using lifetime lubricated ball-bearing on connecting rod and oil impregnated main bearing on shaft. Unusual design forever eliminates valve trouble, the most common fault in air compressors. **PATENTED** unique air intake system increases efficiency tremendously over other compressors so that air output is much greater than that from larger compressors powered by heavier motors. Will deliver approximately 3500 cu. inches of air per minute at maintained pressure of 30 lbs., or will inflate a 90 lb. truck tire in less than one minute. Comes complete with 100 lb. gauge, although finger-tip adjustment allows setting of output pressure at any value, which will automatically be maintained. Works from any ¼ H.P. motor. Useful for spraying paints or lacquers, disinfectants, insecticides, annealing or brazing with natural gas, inflating tires, etc. Price $14.50 postage prepaid anywhere in the U. S. Efficient, completely adjustable syphon type spray gun complete with 12 ft. of 100 lb. tested hose available for only $7.75 with pint container, also prepaid. 25% required on all C.O.D. orders. Send for free catalogs of radio parts and surplus items.

BUFFALO RADIO SUPPLY; 219-221 GENESEE ST., DEPT. S6, BUFFALO, N. Y.

Copyrighted material

Remarkable Invention QUICKLY INFLATES TIRES

Lightweight!
Handy!
Carry It
in Your Car!

Don't put yourself on the spot with tire trouble! It's not funny to be caught with flats, small punctures, or a slow leak when help is out of sight and you're in a hurry.

NOW! BE PREPARED . . .

with the new, modern on-the-road emergency aid. Carry a handy, lightweight Diamond Emergency Unit in your car—the miniature-size steel cylinder containing compressed CO_2 that inflates tires instantly, automatically. Nothing to it! No pumping, towing, or struggling with dirty tools. Simply attach and open valve. In less than three minutes you can be on your way. Safe, odorless, stainless carbon dioxide even helps preserve tires.

PUT OUT FIRES, TOO!

(**No** car or truck engine is fire proof.) Crowds out oxygen in split second—smothers oil, gas, and electrical fires. Without even raising the hood—you can extinguish engine fires! Size—12¾" x 1⅞". Weight—2 lbs., 6 oz. Get Diamond Emergency Unit NOW—only $6.45.

SEND NO MONEY—Simply mail name and address. On delivery, pay postman $6.45 plus C.O.D. charges. Order today or write for details.

THE AKRON LAMP & MFG. CO.
116 High Street **Akron 11, Ohio**

FREE! Large folder on valuable **BODY-BUILDING, TRAINING, HEALTH,** and **STRENGTH** books for boys and men. Also **free** an inspiring picture of a well-developed athlete (Wallet-size, 3" x 5"), **ACTUAL** PHOTOGRAPH. Send us your name and address and 10c stamps or coin to cover mailing costs. WRITE TODAY to
Cross Company, Box 389, Dept. V-2, Kenosha, Wis.

TOY PISTOL

$1.49 each
Postage extra

ENCLOSE MONEY
NO C. O. D. ORDERS

Beautiful TEXAN REPEATER 10¼" length, polished nickel with ivory handle, engraved stock and barrel, revolving cylinder automatic opening device—just the thing for a real July 4th celebration—ORDER NOW—supply limited—money refunded if not completely satisfied, and surplus postage returned if any.

TEXAN PISTOL ONLY (Postage extra)	$1.49
TEXAN PISTOL & 15 PACKS ROLL CAPS (Express F.O.B.)	2.50
TEXAN JR PISTOL—LENGTH 9" (Postage extra)	1.00
TEXAN JR PISTOL & 22 PACKS ROLL CAPS (Express F.O.B.)	2.50
ARMY 45 PISTOL—LENGTH 7¼" (Postage extra)	1.00
ARMY 45 PISTOL & 22 PACKS ROLL CAPS (Express F.O.B)	2.50
EXTRA ROLL CAPS (ONE PACK 250 SHOTS) EACH	.07

When ordering Pistols without caps add enough money to cover postage, One Gun for Parcel Post weighs about 2 Lbs.

Pistols & Caps or Caps alone do not require money for postage as they are shipped by Railway Express F.O.B.

MAKE YOUR OWN SPARKLERS

Harmless Chemical Set—Everything complete including instructions for making your 4th of July Sparklers. Order Now—Supply Limited.

ONLY $1.50 Per Set Postpaid

C. C. Groff, 116 S. Broad St., Lancaster, Pa.

CONFIDENTIAL LOAN SERVICE

Borrow $50 to $300.00

Need money? No matter where you live you can borrow **BY MAIL** $50.00 to $300.00 this easy quick *confidential* way.

BY MAIL

IT IS EASY TO BORROW BY MAIL! Completely confidential and private **CONVENIENT MONTHLY PAYMENTS**

NO ENDORSERS NEEDED
EMPLOYED MEN and women of good character can solve their money problems quickly and in privacy with loans **MADE BY MAIL.** No endorsers or co-signers. We do not contact employers, friends or relatives. Convenient monthly payments. Send us your name and address and we will mail application blank and complete details FREE in plain envelope. There is no obligation.

STATE FINANCE CO.
216 Savings & Loan Bldg., Dept. N-13, Des Moines 8, Iowa

Now CHEAP OIL BURNER

FOR HEATING AND COOKING STOVES-FURNACES

HEAT YOUR HOME, COOK YOUR MEALS WITH CHEAP FURNACE OIL

NO MORE SHOVELING COAL OR ASHES. Sensational Fuelizer Starter Vaporizing System turns Cheap No. 1 Furnace Oil, also Range, Heater, Tractor Distillate, Kerosene and like oils into oil heat—one of the quickest, hottest fires known. LIFETIME GUARANTEE. **$1.00 Bonus Offer for Testing.** We will let you try it in your own stove or furnace for one month. Get yours for introducing. Big profits QUICK. Be first. Send in your name today for details and cash in on the tremendous demand for this Amazing Invention.

NORTHWEST MFG. CO. 606-G. Mitchell, S. Dak.

NEW B-M POWER MOWERS

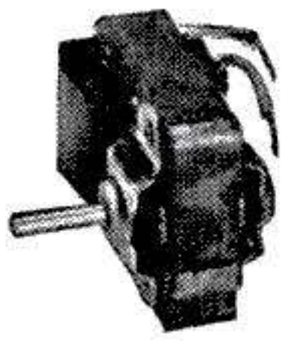
DEALERS WANTED

At LOW FACTORY COST

• **For Modern Lawn Care** Newest type three-wheel rotary blade mower. Prompt shipment with 1½ h.p. Clinton engine. Choose from two models of assembled mowers or Build-it-yourself kit of parts. **Guaranteed.** Write for Free literature.

B-M MOWER CO., Box 66-S
Blue Mound **Kansas**

AMAZING • NEW ELECTRIC MOTOR



New Fractional A. C. H. P. Motors for the Amateur or Pro
A compact factory-built power unit to meet numerous small motor requirements, ideal for home appliances, toys, fans, movie projectors, small grinders and many other useful applications. Develops up to 1/100 H.P. under continuous load. 110 volt A.C., 60 cycle, no load speed 3300 R.P.M. Special price $1.75 each.

ONLY $1.75 POSTPAID NO C.O.D.

THE ROTOR CORPORATION • Miamisburg, O.

AROUND THE WORLD FOR 10¢

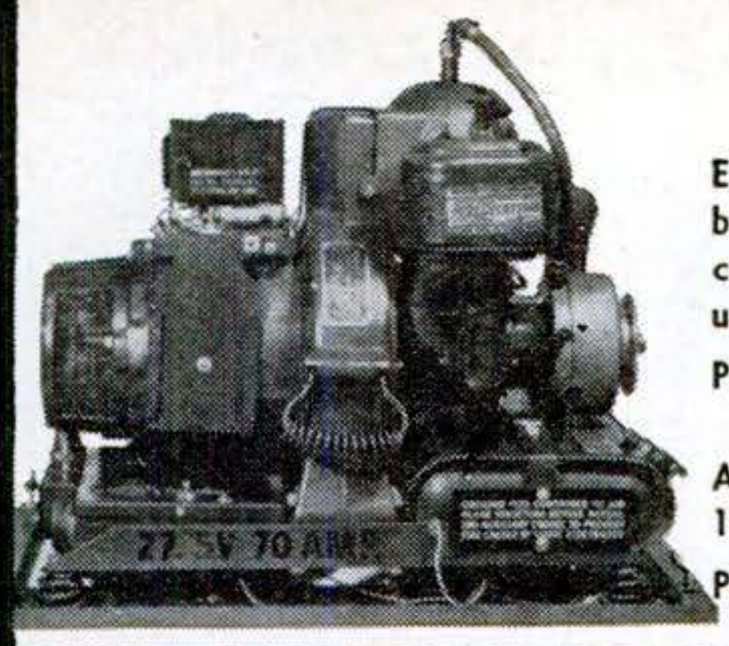
NEW, EXCITING, EDUCATIONAL HOBBY! **Collect emblems of world famous hotels, air, steamship lines, railroads, major league teams, etc. etc. Send 10¢ with this ad for introductory sample packet, also new catalog and Honorary Membership Card with *your name in gold.* • VOGUE SPECIALTIES**
401 CARNEGIE HALL, DEPT 50, CLEVELAND 15, OHIO

EYE-GLASSES BY MAIL

16 Days Trial

Write Today for Free Catalog. Send no Money
ADVANCE SPECTACLE COMPANY
537 South Dearborn Street, Dept. SP6, Chicago, Illinois

Unless Otherwise Specified, This Equipment Has Been Removed from Surplus Aircraft



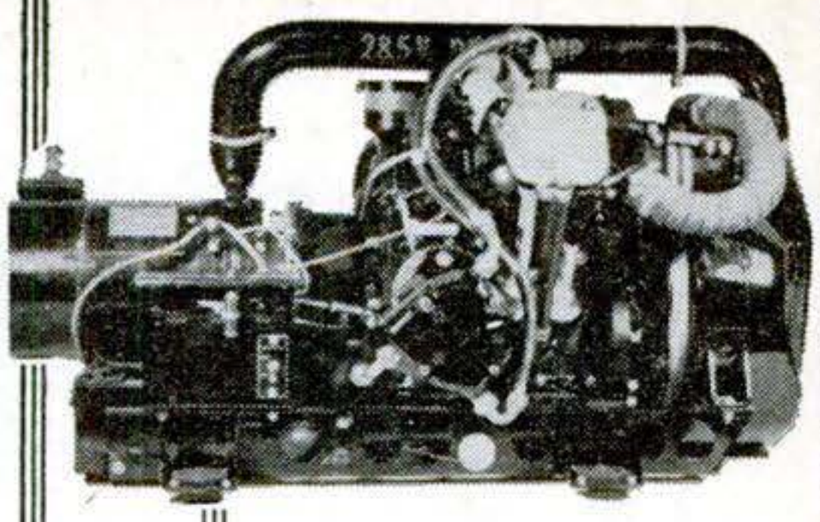
27.5 V. DC — 70 AMP. GASOLINE GENERATOR

Electrical starting when connected to 24 V battery. Ideal for power for emergency, cabins, aircraft, welding etc. Originally used for auxiliary power on bombers.

Price.....$72.50

A similar power plant may be obtained for 110 V — 60 cycle AC operation.

Price.....$275.00



28½ V. DC 170 AMP. GASOLINE GENERATOR

Excellent for farm or camp lighting, emergency radio equipment, etc. Powered by Ranger Aircraft 2 cycle, 9 hp. gasoline engine. This engine is worth the price alone to use for propelling boats, midget cars, scooters.

Price.....$195.00

GRIMES LANDING LIGHT

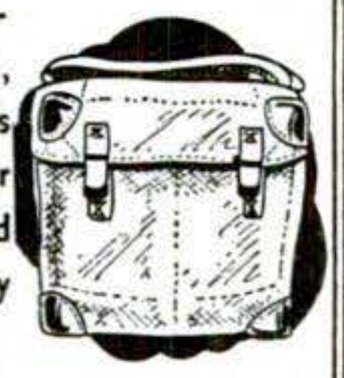
600 Watt — 24 V. Operation

4 of these lights wired in series will produce ideal floodlights for baseball fields, outdoor playgrounds, parking lots, etc.

Price.....$4.95

KNAPSACK—BRAND NEW

Made of heavy waterproof army duck, 9" x 14" x 14", it is durable and ideal for camping trips and adaptable to many uses.



Price.....$3.95

CASH WITH ORDER

AMERICAN SURPLUS PRODUCTS CO.

537 N. CAPITOL AVE. — INDIANAPOLIS, IND.

MAGNETIC COMPASSES

May be compensated for use in automobiles, boats, aircraft. Were sold new for several times our low price.....$9.50 ea.

SAVE up to 85% on NEW HYDRAULIC CYLINDERS

VALVES, PUMPS, FITTINGS, HOSE, TANKS

The World's Largest Supply, 1001 labor saving adaptations for pulling, pushing, lifting operations. Finest precision workmanship and materials. Liquid and/or air operation.

15% GOVERNMENT COST

PNEUMATIC RIVET GUNS

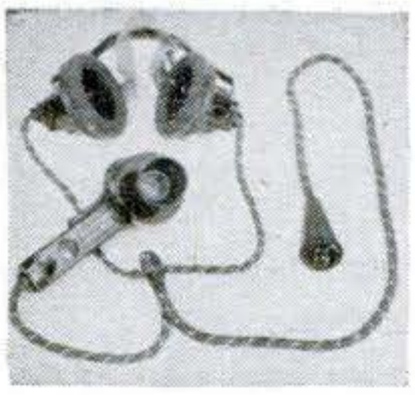
CHICAGO, CLEVELAND AND ALL OTHER STANDARD MAKES #181

Used but in Swell Condition.

Send for Free War Surplus Catalogue $8.95

PALLEY SUPPLY CO. Dept. P.S. 67, 6321 San Fernando Rd., Glendale 1, California

ARMY RADIO PHONES



They're Weather — Water and Shock Proof ————

When we say they are made to Army specifications, that's enough assurance they must be of best quality. These Army Radio Phones are perfect and were O.K.'d by Signal Corps Inspectors. These Dynamic Mikes and Receivers, were used on aircraft and tank inter communication systems. Use them for recording, for batteryless phone, for pocket size set loud speaker or talk through your radio set. We bought a good many of these Radio Phones, they are brand new, and cost a great deal more than you can get them for. A complete dynamic hand mike, 2 earphones, headband, cord set. A wonderful buy for only . . . **$3.45**

Send check or Money Order. FOB warehouse

LEEDS RADIO CO.

75 Vesey St. Dept. PS6 New York City 7

$5000.00 CASH PRIZES FOR INVENTIONS

- Grand total of $5,000 cash prizes will be awarded for best inventions.
- Judges will be nationally-known scientists and industrialists.
- No restrictions on the type of inventions —radio, plastics, home appliances, etc.
- Models, drawings, plans, copies of patents or printed matter may be submitted.
- Your invention will be fully protected— no invention or Model will be loaned to anyone without your express permission. Whether you attend in person or not, your rights will be protected —guards on duty at all times.
- Manufacturers also are invited to show their new products— Buyers, Exporters and their representatives will be present.
- It's the greatest World Inventors' Exposition in history. The first get-together between inventors and manufacturers, in the world's largest 1-floor auditorium space!

WORLD INVENTORS' EXPOSITION
PAN PACIFIC AUDITORIUM
LOS ANGELES, CALIF.
TEN DAYS ONLY! JULY 11-20, 1947

Sponsored by United Inventors and Scientists of America. The Greatest Inventors Show on Earth!

YOU MAY WIN BIG CASH PRIZES!

1ST PRIZE . . . $1000 CASH

72 other cash prizes including 40 Twenty-five dollar prizes!

- Your invention will be seen by thousands of manufacturers, jobbers, distributors. You may sell or lease your invention, patent or idea—make permanently useful contacts.

Get your model ready now! Write for details TODAY

WORLD INVENTORS' EXPOSITION, 2712-1/2 West Seventh Street, Los Angeles 5, Calif.

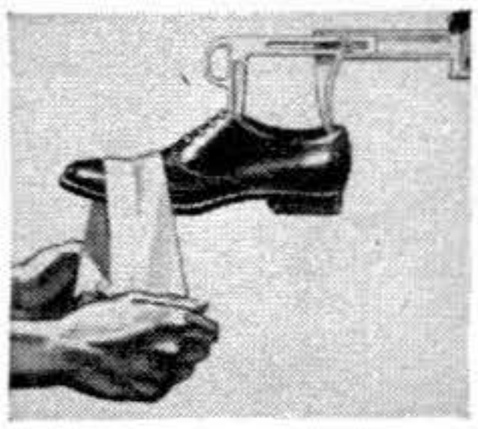
Copyrighted material

WANT A NEW JOB?

BE NEAT AND WELL GROOMED

SHOE SHINE KIT

ONLY $2.98 COMPLETE



EASY TO USE. Simply place shoe on form, form on wall bracket and polish. The complete outfit includes a polishing cloth, one form for men, one for ladies' and children's shoes and sturdy wall bracket. *SATISFACTION GUARANTEED OR MONEY REFUNDED.* Immediate Delivery.

(Dealers and Agents Wanted)

CLIP THIS COUPON—MAIL TODAY

ACME SALES CO., 943 E. 72 St., Cleveland 3, Ohio PSJ

Please send *complete* "Shoe Shine Kit" *prepaid.*

Enclosed is ☐ Check ☐ Money Order.

Name_____

Address_____

City_____ State_____

HAVE YOUR OWN BUSINESS!

Operate pleasant, profitable Silk Screen Printing Shop. NO experience needed. Work at home in spare room or basement. Big demand! Large profits! Few dollars starts you. Start small, grow big. Real future possibilities! Eye-opening literature FREE.

W. E. WOLFF CO., 817-A High St., Anderson, Indiana

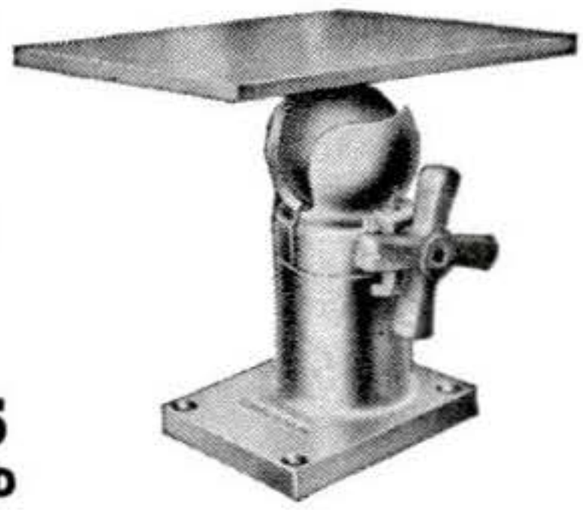
Say You Saw It In Popular Science

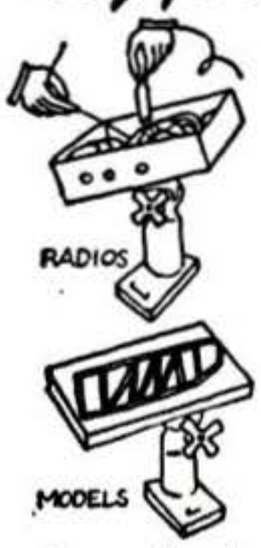
It's on the Ball!

POSITIONETTE

An extra pair of hands

Holds work in any position





$4.95 POSTPAID

Made entirely of precision high grade aluminum castings. The exclusive locking device holds work in any position by a single twist of the handle. An essential tool for every Model Builder, Radio Builder, or Home Craftsman.

Send check or Money Order TODAY

BROWN MFG. CO.

35711 St. Clair Avenue Willoughby, Ohio

Name_____

Street_____

City_____ Zone____ State_____

Ball-Bearing SPEED WHEELS

Juvenile wheels, solid tire

7" wheels.....60c
6" wheels.....50c
4" wheels.....30c

Semi-pneumatic tired wheels

12 x 1.75".....$3.25
10 x 1.75".....$2.75
8 x 2".....$2.00

Industrial wheels

10 x 2.75".....$6.75
8 x 1".....$4.90
6 x 2".....$2.80

Dealers Wanted

JIM BROWN TOY COMPANY

1093 Home Ave. Akron 10, Ohio

Amazing Low Cost Aladdin's Tool

DOES ALL TYPES WOOD SHAPING

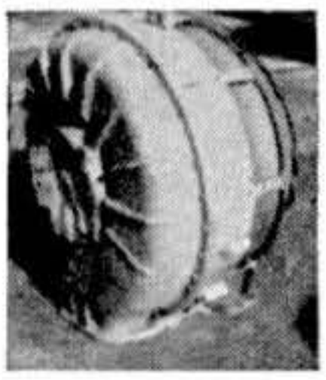
ROUTING, TONGUE and GROOVE, FLUTING NOTCHING, INLAY, ANY TYPE OF JOINT

If your dealer does not stock this item order direct giving his name & address so we may credit him.

$5.95 COMPLETE

Comes with 2 ground blades and 4 blank blades for grinding to shape needed for any particular job. These 6 blades will make 12 different cuts. Send $5.95 check, cash or money order for prepaid shipment, or name and address on 1c postcard for C.O.D. shipment.

DESIGN CO. 2016 East 31st St. Dept. S16, Kansas City, Mo.



SUPERCHARGERS

Aircraft surplus, turbo type, complete. Can be converted into blowers, turbines, etc. Cost to Gov't approximately $3,000. Sale price **$15.00** each while they last. FOB, Harrisburg, Pa. No COD. Send check or money order to: **MICHEHL INDUSTRIES, ATLANTIC BLDG., WASHINGTON, D. C.**

DRILL PRESS VISES

B-1 **$6.50**

No. A-1. HEAVY DRILL PRESS VISE, 3 in. width, 1¼ in. depth, jaw opening 4 in., weight 10 lbs. Price **$14.50** prepaid.

A-2 Semi-Finished **$8.50**

No. A-2. SEMI-FINISHED VISE, same as A-1 above. Can be finished on small lathe. Price **$8.50** prepaid.

No. B-1. SMALL VISE, same type as A-1 above, 2 in. width, 1 in. depth, jaw opening 2 in. Sold finished only. Price **$6.50** prepaid. Shipped postage prepaid on receipt of money-order . . . if ordered C.O.D. send **$2.00** with order, balance and charges will be collected.

LeMay Electric & Machine Co. **P. O. Box 635 Manchester, N. H.**

YOUR HAIR *AND ITS CARE*

By O. Levin, M.D., and H. Behrman, M.D.

Two doctors tell you what to do to save and beautify your hair, stimulate healthier hair growth, and deal with many problems, as: **Dandruff—gray hair—thinning hair—care of the scalp—baldness—abnormal types of hair—excessive oiliness—brittle dryness—hair falling out—infection—parasites—hair hygiene, etc., etc.**

"A worthwhile book full of important information."
—**Ohio State Medical Journal.**

Price $2.00, incl. postage. 5-day-Money-Back Guarantee

EMERSON BOOKS, Inc.

Dept. 886-C 251 W. 19th Street New York 11

Copyrighted material

AVIATION

Aeronautical University Approved Training meets exacting standards of aviation industry, prepares for key positions, big opportunities.

Courses in:

AERONAUTICAL ENGINEERING. B.S. degree.
AERONAUTICAL ENGINEERING DRAFTING
CERTIFIED ENGINE MECHANICS
ADMINISTRATION—including sales

PRE-ENGINEERING: Special course for high school graduates and veterans deficient in math and science.

Also refresher courses for Gov't. Airplane and Engine Mechanics Licenses for those with aviation experience.

Oldest fully approved aviation school. Outstanding faculty, modern equipment, outside employment, placement service. Day, evening. Approved for Veterans. Send today for **FREE** catalog "Opportunities in Aviation."

FOUNDED BY CURTISS-WRIGHT

AERONAUTICAL UNIVERSITY
Dept. 87, 116 S. Michigan Avenue, Chicago 3, Illinois

Learn Penmanship

You can become a good penman right in your own home during spare time by my Simplified Method. Write for my FREE Book, "How to Become an Expert Penman," which shows what others have learned. If desired, send 10c for one of my favorite Pen Points and your name with a beautiful flourished bird written on a card. Write for the Free Book today.

T. M. TEVIS, BOX 25R, CHILLICOTHE, MO.

Learn Profitable Profession in 90 days at Home

MEN AND WOMEN. 18 TO 50—Many Swedish Massage graduates make $50, $75 or even more per week. Large full time incomes from doctors, hospitals, sanatoriums, clubs or private practice. Others make good money in spare time. You can win independence and prepare for future security by training at home and qualifying for Diploma. Anatomy Charts and 32-page Illustrated Book FREE—Now! **THE College of Swedish Massage, Dept. 770G, 100 E. Ohio St., Chicago 11, Ill.**

WANT TO EARN MORE MONEY

Learn SILK SCREEN PROCESS At Home. FREE big illustrated Book explains how my training enables you to start your own successful business or train for a better job in this well paid, uncrowded Advertising Field. Learn and Earn in your spare time. Complete Kit of Supplies included. Write TODAY.

CALIFORNIA SCHOOL OF SCREEN PROCESS
Dept. PS67, 3740 Overland Blvd., Los Angeles 34, California

LEARN MONEY-MAKING CARTOONING

IN SPARE TIME — by Easy Picture Chart Method

Same Simplified Method that has helped train creators of "Terry & Pirates," "Freckles," "Out Our Way," "Winnie Winkle," "Reg'lar Fellers," "Strange As It Seems," "The Neighbors," and many others. Earn while learning. Send 10c for Picture Chart (to test your ability). Samples of successful students, and full details. (State age.)

Landon School of Cartooning, Dept. 4726, Philadelphia 1, Pa.

Store Route Plan PAYS BIG MONEY

SELL COUNTER CARD PRODUCTS

Build a good-paying business of your own: Call on dealers of all kinds; show nationally-advertised Aspirin, Vitamins, Cosmetics and 200 other necessities. Big 5c and 10c retail packages, high quality. Attractive counter displays sell goods fast. Free book gives amazing facts. Write!

World's Products Co., Dept. 83-N, Spencer, Ind.

New Designs in FRANZITE GRIPS

Modernize Your Gun! Improve Your Score!

Most durable grips made. Positively unbreakable! For Colt, Smith & Wesson, Hi-Standard. Ortgies, Luger & Mausers in a wide choice of beautiful designs in ivory, pearl, walnut, onyx, etc. Low prices. FREE CATALOG. Dealers Wanted.

SPORTS, INC., (Mfrs.) 5501 Broadway, Dept. S-6, Chicago 40, Ill.

MAKE UP TO $10 ON EVERY SALE!

AIR CORPS TYPE SUN GLASSES

$5.00

SELLS EVERYWHERE UP TO $15 and MORE!

A Real Fast Money-Maker! Here are genuine 12-Karat gold-filled, Air Corps Type SUN GOGGLES complete with "Pearltex" sweat bar, brow rest and rocking pads, scientific ray-absorbent "No Glare" ground and polished sage green lenses, dropped before curving, and self-adjusting comfort cable ear pieces. Handsome crush-proof case included. Will protect eyes from glare, sun, wind, dust and exposure. Wonderful for auto drivers, policemen, golfers, gardeners, farmers and all outdoor workers and sportsmen. Available in Men's & Ladies sizes. Sold on 10-day no risk trial, money-back guarantee. You can easily sell 3 or more pairs a day. Send for your sample pair of these fine Sun Goggles —only $5.00, postage prepaid. Or send no money. Just deposit $5.00 with your own postman, plus postage—your money back if not delighted.

MIDWEST SCIENTIFIC CO. 1148-1160 W. Chicago Ave. Dept. 807 CHICAGO 22, ILL.

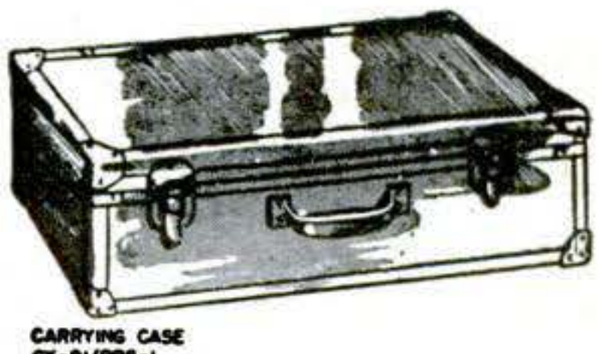
Say You Saw It In Popular Science

YOU CAN *NOW* BECOME A PROSPECTOR!

HERE IS ONE OF THE WAR'S TOP SECRETS

BRAND (NEW) ARMY MINE DETECTORS!

Portable: Will Detect METALLIC and NON-METALLIC objects; Very Sensitive; using 955 Tube in detecting head; two tube amplifier using two 1N5gt; headset; or microphone; also 150 micro meter; Power supply; 3-45v.; one 6-v.; or 2 3-v. batteries. Complete with instr. Less Batteries; packed in original cases; shpg. wgt. 108 Lbs.



CARRYING CASE CY-91/PRS-1

F.O.B. from N. Y.

(Less Batteries) **$17.50**

With Batteries F.O.B. N.Y. **$26.40**

NO C.O.D.

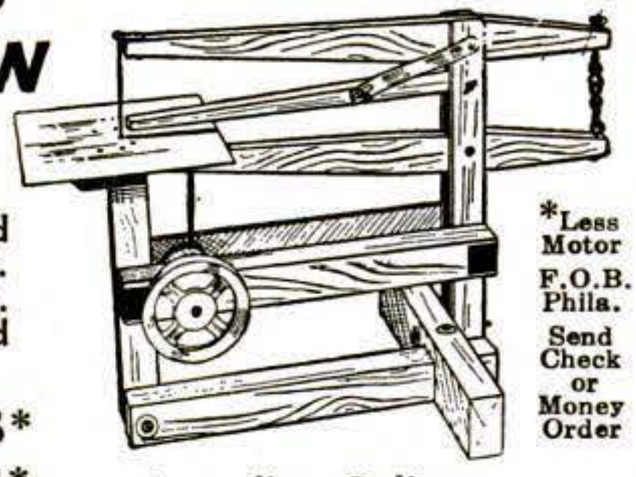
Send order to

COLUMBO TRADING CO., INC.
304 CANAL ST. NEW YORK 13, N. Y.

Copyrighted material

Get More Out of Woodworking With A

"LONG-LIFE"
JIG SAW



Made of selected Oak and Fir. Sturdy. Oilite bearings. Easy to use. Good gift idea.

16-INCH $12.95*
26-INCH $16.95*

*Less Motor F.O.B. Phila. Send Check or Money Order

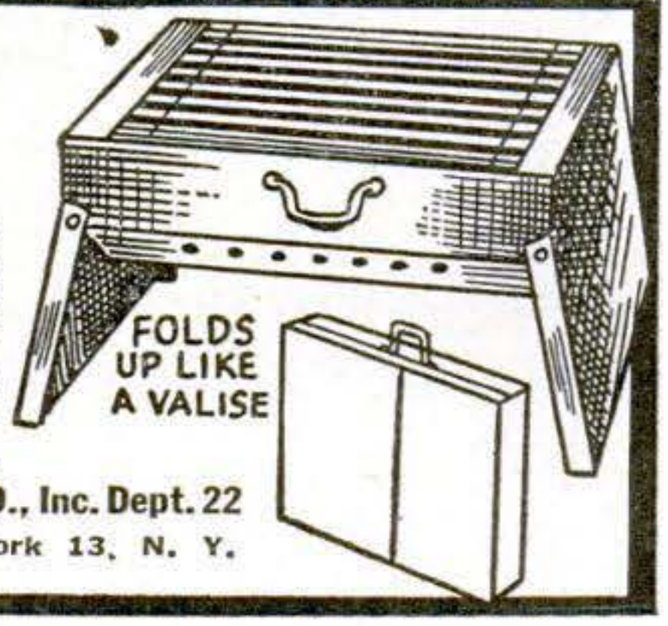
Immediate Delivery

Combination belt-disc Bench Sander $28*
Two-knife head 4-inch Jointer $65*

WM. H. SHELLINGTON 2055 Hunting Park Ave. Phila. 40, Pa., Dept. PS
MACHINERY SALES & SERVICE

PORTABLE CHARCOAL GRILL

$5.95



Ideal for outdoor camping, picnics and your home yard. Made of heavy gauge steel. Beautifully finished in enamel. Folds up, size 18 by 12 by 3½ inches. Order today. Mail check or money order and we pay delivery charges.
Write for Free catalog.

EDWARD LAWRENCE CO., Inc. Dept. 22
396 Broadway, New York 13, N. Y.

PLASTICS

WORK IN A FASCINATING AND PROFITABLE HOBBY

We carry a complete line of plastic supplies and accessories. Send 10c for our latest catalog and fabricating manual.

HOUSE OF PLASTICS
8648 Linwood MO Dept. Detroit 6, Michigan

Magi-Klips Kit

Teach Yourself Radio & Electronics!

Build 18 Experiments Without Tools!

You've read about this radically new kit designed by former Navy radar engineers. Pre-wired chassis enables you to build 18 different circuits—*radio receiver, code oscillator, home broadcaster, photoelectric relay,* etc.—by "clipping in" basic components as directed in simply-diagrammed manual. 110 v. AC or DC. Kit's 58 parts alone would cost double this low price. Order your *Magi-Klips* Kit today and learn electronics quickly at home. Send for free illustrated folder to show friends interested in learning electronics this easy way!

$29.75 Complete

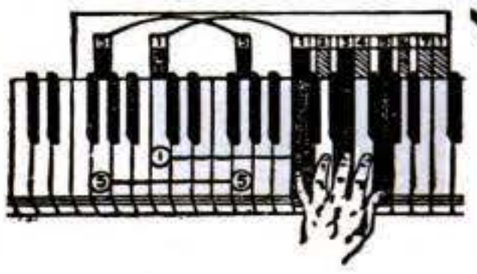
DEER & TAYLOR COMPANY
Dept. M, 1340 Milvia St. Berkeley 9, California

Hear ROOSEVELT Again

Hear the famous Victory speeches of FRANKLIN ROOSEVELT and WINSTON CHURCHILL on your home phonograph. Preserve history for your children. Two records in beautiful album, only $2.98 prepaid. Satisfaction or money back. Hurry, the supply is limited—send NOW!

MoorCo Sales Company,
P.O. Box 787, Station H, Los Angeles 44, Calif.

PIANO in 1 HR. with



NEWLY INVENTED SLIDE-CHORD DEVICE. Fits piano. Play any chord at once. Plink out songs by ear and note and add chords to play beautiful 2-hand professional radio style at one sitting. Complete course in **one** package—no extras needed. Fun! A ga. . ! No exercises or drills. Startle your friends! **PLAY 27 COMPLETE SONGS WITH 4 CHORDS (SEND NO MONEY) (JUST 1c CARD).** 25 lessons ABC METHOD including many POPULAR SONGS and SLIDE-CHORD DEVICE ALL for $2 plus C.O.D. Save C.O.D. Send $2 cash, check, money order. MONEY BACK GUARANTEE.

DALE SHEAR'S SCHOOL OF MUSIC, Studio 4106, Struthers 3, Ohio

BUILD YOUR OWN ZEOLITE WATER SOFTENER

Save up to 50%. Pays for itself. Fun to build. Only a wrench required. All materials available. Send $1.00 check or money order for simple and complete plans and operating instructions.

BOX 2732-S LAR MFG. CO. MINNEAPOLIS 7, MINN.

TRAIN
Your VOICE!

Results GUARANTEED

We build, strengthen the vocal organs—not with singing lessons—but by sound, scientifically correct silent and vocal exercises and absolutely guarantee complete satisfaction with results. Write for Voice Book, FREE. Sent to no one under 17 years old unless signed by parent

Perfect Voice Studios, Studio 136-A, Kimball Hall Bldg., Chicago 4, Ill.

NAILS

Over 1000 nails in assorted sizes $1.00. Shipping weight 8 lbs. or Bargain Assortment 3 times as large $2.00. Ship. Wt. 26 lbs. Include shipping charges with currency or M.O. remittance. No C.O.D.

PRAIRIE NAIL & SUPPLY CO., Dept. A-2,
1327 W. Randolph St. Chicago 7, Ill.

MAKE MONEY AT HOME

RUBBER MOLDS *Low as* 6¢ EA.

Amazing rubber mold-making outfit makes perfect flexible molds of plaques, ash trays, bookends, etc. Molds cost 6c to 25c each. Each mold makes hundreds of novelties and gifts to sell for $1.00 apiece and more! No experience necessary. Everything furnished. Quick and easy. Start profitable business in your home—sell to stores, gift shops, friends, resorts, road stands, by mail. Full or spare time. Write for complete FREE details and easy instructions.

SO-LO WORKS, INC., Dept. W-801, Loveland, Ohio

Copyrighted material

BIG MONEY and YOUR OWN BUSINESS in LIQUID IVORY

FREE INFORMATION ON A GREAT NEW MONEY MAKING OPPORTUNITY

SEND FOR FREE DETAILS

Regardless of your age, sex, previous experience, we will send you astonishing free facts about the unlimited possibilities—in your own business—with amazing LIQUID REPLICA IVORY. To secure this information, absolutely free, fill in coupon below or send a letter or postcard. No salesman will call on you now or ever. Write TODAY! Offer limited!

LIQUID IVORY is one of the most marvelous synthetics developed in years. With it you can easily and simply produce a wide variety of wonderful items that almost defy detection from genuine ivory. No expensive equipment is needed. You can work in a corner of your basement or garage with a few hours of work producing handsome profits. Here is unexcelled opportunity for all ambitious people that want a profitable business of their own.

A MONEY-MAKING BUSINESS FOR THE LITTLE MAN! NO EXTENSIVE CAPITAL NEEDED!

Forget big investment worries. We tell you how to get your own fast-moving business going with very little money. We feature only one sound business course. You will never find us confusing this successful vocation with other diverting business ideas. We tell you all about one great business and how you can make money in it exclusively. Write for full FREE information today!

Greatest Opportunities NOW!

Stop being a slave to a time clock! Stop worrying about lay-offs and depressions stealing your livelihood. NOW is the time to line up your own money-making business. We offer this great opportunity to aggressive people. Get into your own profitable business with LIQUID IVORY. Get the FREE FACTS today!

EMPIRE TRADES and HANDICRAFTS
Box 1340-PS St. Louis, Mo.

FREE INFORMATION COUPON

EMPIRE TRADES & HANDICRAFTS, BOX 1340-PS ST. LOUIS, MO.

Please send me free details about your BIG money making LIQUID IVORY. I am anxious to get started in a profitable business of my own. Please rush!

Name.....

Address.....

City.....State.....

$6.50 Postpaid

DRAINS CELLARS, WASH TRAYS, CIRCULATES OIL

1800 GPH 300 gal. 30' high, use ⅛ to ⅓ HP motor, will not clog. Self-Priming unit ready for your motor. ..... Postpaid **$13.95**

Add 50c for west of the Mississippi, which applies to both pumps.

Mfg. Pumps for over 20 years

LABAWCO PUMPS, BELLE MEAD 3, N. J.

GIANT FLOOD LIGHT

AS MADE FOR THE U. S. NAVY

ILLUMINATES LARGE AREA. Protect Your Home Against Burglars & Prowlers. For: Estates — Farms — Gardens—Schools—Churches—Plants—Driveways—Tennis. Easily installed. 14 ft. heavy rubber cord. Weatherproofed. Takes AC or DC current. Frosted Lens. **BRAND NEW.** Costs only fraction of cost to gov't. Includes standard bulb. 150-watt size, 14" diameter, wt. 8 lbs., $15; 300-watt size, 17" diameter, wt. 15 lbs., $25; 500-watt size, 17" diameter, adjustable any position, wt. 20 lbs., $35. **Money Back Guarantee.**

Send Order Today With Money Order or Check. Express charges collect.

CARNAGEY'S, 29 Central Avenue, Dept. ML-1, Tarrytown, N.Y.

All-Purpose BINOCULARS $3.98

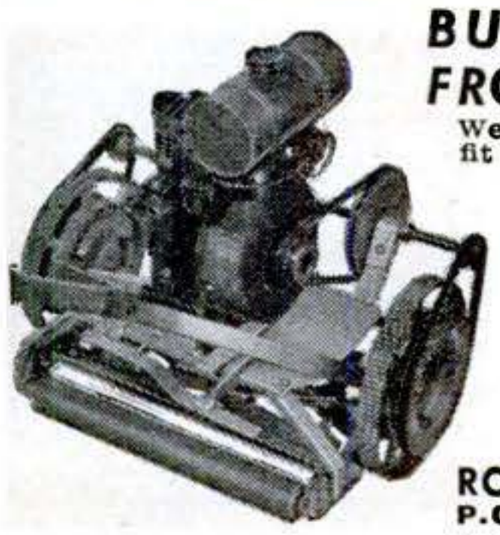
With Carrying Case and Shoulder Strap

Perfect for sport events, theatre, etc. 3-power plus Da-Brite binoculars, adjustable for focal length. $10.00 value for $3.98. Money-back guarantee.

POSTPAID

TRENIEW CO. 4818 N. Bernard St. Chicago 25

• POWER LAWN MOWER



BUILD ONE YOURSELF FROM YOUR OLD MOWER

We supply complete attachments that fit any make or size of mower, with or without 1½ H.P. gas engine. Easy to install in less than an hour. No more back breaking mower pushing. Immediate delivery, at low prices.

MONEY BACK GUARANTEE

You'll be delighted! Complete satisfaction or your money back. Write for

FREE FOLDER

Dealers Wanted.

ROYAL OAK LAWN MOWER SHOP
P.O. Box 48 Royal Oak 1, Mich.

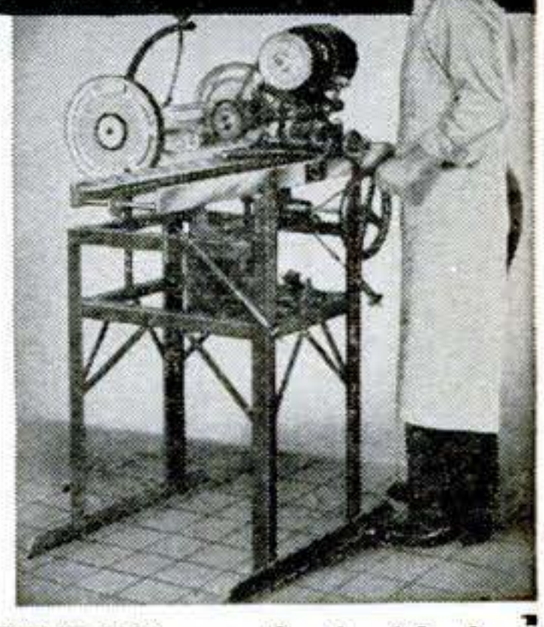
METALLIZE BABY SHOES

Learn this easy, money making business from nationally recognized consultant. Perpetual market, small investment, interesting work. Get know how from outstanding authority. For free details write **JOSEPH B. KUSHNER,** *Metal Finishing Engineer,* **RD3G, STROUDSBURG, PA.**

EARN MORE MONEY

GRINDING LAWN MOWERS

"THE UNIVERSAL WAY"



FULL or SPARE TIME

Build a Business of Your Own in Your basement or garage and earn $135 a month. Mr. Felber of Ind., writes, "My UNIVERSAL GRINDER is faster and more accurate than any other grinder. Its efficiency enabled me to sharpen 450 mowers in 4½ months. More than paid for itself the first month. Every customer satisfied." Mr. Hardy of Mississippi writes, "Received my Universal Grinder the first part of May and by August 18 had sharpened over 1000 mowers." Mr. Bacon of California writes, "The lawn mower business, with the use of my Universal Grinder, has been a gold mine these last two years."

Only on the UNIVERSAL GRINDER can the inside face and edge of the stationary blade, as well as the reel blades, be ground to proper clearance

ALL IN ONE SET-UP

WITHOUT REMOVING ANY BLADE FROM THE MOWER

Tool Grinding Rest Included

Write for Free Folder

Rogers Mfg. Co., Dept. P-67, Lindsey, Ohio

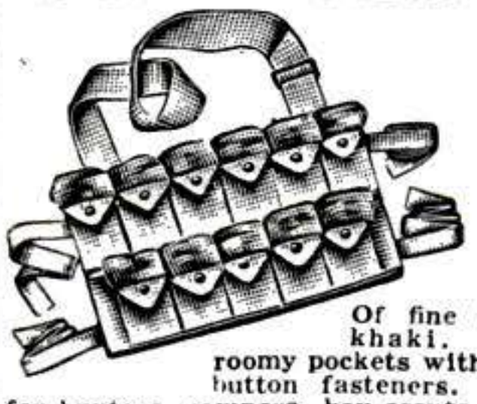
Copyrighted material

WAR SURPLUS AND HUNDREDS OF OTHER BARGAINS

SATCHEL POUCH

Heavy canvas pouch. Ideal for toting lunches, shopping, books, etc. Has 11 x 12 inch pockets. Brand new, guaranteed perfect. A113—Each..... **$1.69**

ARMY BANDOLEERS



Of fine heavy khaki. Big roomy pockets with snap button fasteners. Fine for hunters, campers, boy scouts, etc., also for shop work in carrying small parts, etc. Material alone is worth this price.
11 Pocket Type No. 129. EACH **49c** | 5 Pocket Type No. 128. Each **29c**

BERNARD WIRE PLIERS

Parallel acting jaws. Wire cutter at top. Brand new. Wgt. 2 lbs.
No. 168. Each..... **$1.29**

ONE MAN RUBBER BOAT

Similar to above but smaller. Designed for one man use. Each boat complete with oxygen tank--packed in a special parachute bag. Wgt. 15 lbs.
No. 526—Each..... **$17.95**

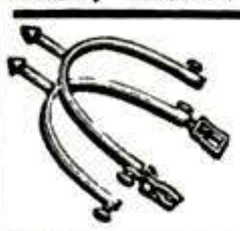
WOOL SLEEPING BAG

G.I. type 100% wool with 30 inch Talon zipper. Used but renovated for reissue. Shp. wgt. 3 lbs. No. 165. Each. **$3.95**

SHERRILL COMPASS

A finely balanced, liquid immersion accurately calibrated compass with mtg. bracket. Measures 5x3 inches. Compensating adjustments. Worth much more. Shp. wgt. 5 lbs. No. A122, Each..... **$9.85**

CAVALRY SPURS



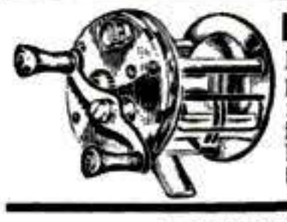
Genuine wishbone type cavalry spurs. Nickeled brass A102, Pair... **98c**
A103 Spur straps per set of four..... **50c**

2-Pc. Rain Suits

New 2 piece rain suits. Of durable wear resisting water and wind repellent OD fabric. Bib style pants, zipper fly. Jacket has parka attached. Guaranteed 100% weatherproof. Small, medium and large sizes. Shp. wgt. 3 lbs.
No. R549 Each.... **$4.95**

TELESCOPING BAIT and FLY ROD

Combination 4 piece telescoping bait and fly casting rod. Screw locking reel seat. Cork grip. Snake guides. Extends to 9 feet, telescopes to 38 inches. Shp. wgt. 1 lb.
No. F411. Each..... **$3.65**



LEVEL WIND ANTI BACK LASH REEL

Highest quality with chrome plated frame: 3 piece take down design, 4x gears, bronzed bearings and jeweled spool caps. Spool diameter 1½ ins; pillar lengths 1½ ins. Capacity 100 yard line. Onyx head ring. Shp. wgt. 1 lb.
No. 450 F. Each only..... **$8.55**

POPULAR RECORD ASSORTMENT

Fifty records of modern dance, race, blues and hillbilly selections. No two alike. Famous name bands and artists included. Used in juke boxes, but guar. perfect. Shipped exp. collect only—no exchanges or refunds. Wgt. 28 lbs. No. A303—50 records **$9.64**

No. A300—25 Records, All Dance. Wgt. 14 lbs..... **$4.88**
No. A301—25 Records Hillbilly, Race and Blues. Wgt. 14 lbs. Set **$4.88**
No. 302—25 Records All Hillbilly numbers Wgt. 14 lbs. Set... **$4.88**

PLASTIC 8-OZ. FLASK

For hunters, fishermen, scouts. Waterproof and transparent. Use it for liquids, matches, flies, bait, etc. Has screw cap top for liquids, plus full open top. 5½ x 4⅛ x 1⅛ ins. Hundreds of uses. Wgt. 1 lb.
No. A347. Each..... **29c**

BINOCULAR CASE

Heavy cowhide, hand sewn. Die cut top for compass. Will fit 6x30 Bosch & Lomb or similar binocular. Wgt. 2 lbs.
No. A191. Each..... **$2.95**

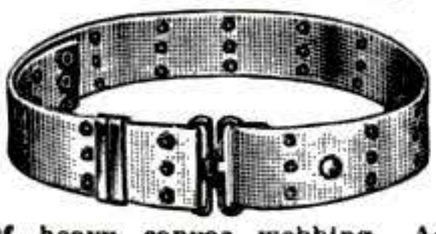
DECORATIVE CHROME STRIPS

For your car, boat, furniture, etc. Highly polished chrome finished strips with clinched edges for flush mounting to any surface. The 3 pound kit provides approx. 43 pieces in lengths from 4 inches to 3 feet and ¼ to ¾ inches wide. Wgt. 4 lbs.
No. R-224—3 lb. Assort. only **$2.00**

7 LB. EXPERIMENTER PARTS ASSORT. KIT

A "gold mine" for the radio serviceman. Hundreds of valuable radio parts, new radar and electronic parts and sub-assemblies, coils, resistors, trimming condensers—worth many times this low price.
A130R —7 lbs. **$1.79**

G.I. PISTOL BELTS



Of heavy canvas webbing. Adjustable. Eyeleted all around. Used but perfect. Wgt. 2 lbs.
No. 131. Each..... **98c**

HAND MICROPHONE

Top quality hand microphone with control button in handle. Highly sensitive. Has rubber covered cord and tel. plug. Fine for use on home recorders, public address systems, etc. Brand new — perfect. Shp. wgt. 2 lbs. Stock No. 170. Each..... **$1.95**

BAYONET BLADE

Fine forged steel. Ground but not polished. May be made into throwing or hunting knife or spear. Blade 6¾x⅞ inches, 11¾ inches overall. Will take and hold a fine edge. Shp. wgt. 1 lb.
No. 664-R. Each... **49c**

MESS KITS

Regulation two piece Army Mess Kits with folding handle. Used, but perfect. Weight 2 lbs. No. A116. Each **69c**

CANTEENS

Reg. U.S. issue canteens. Plastic screw top chained to body. Slightly used but perfect. Wgt. 1 lb. No. 117—Metal. No. 118—Plastic.
Each.... ..... **69c**

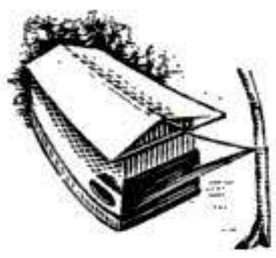
CANTEEN CUPS

All metal. Folding handles. Wgt. 1 lb.
No. A120. Each..... **25c**

CANTEEN COVERS

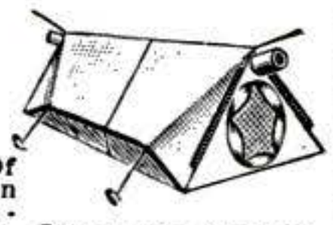
Heavy canvas. Button fastener.
New No. 530. Each..... **69c**
Used No. 119. Each..... **35c**

JUNGLE HAMMOCK



For back yard, country home and camp use. Has waterproof roof with mosquito-proof nylon netting side. Lets you sleep outdoors safely. Finest construction. Originally designed for U. S. Army use. Shp. wgt. 7 lbs.
No. 134. Each..... **$5.95**

2 MAN MOUNTAIN TENT



Regulation Army type two man mountain tent, complete with poles, guy ropes, etc. Of durable nylon with reinforced seams. Ideal for outdoorsmen, campers, etc. Shp. wgt. 10 lbs. A splendid value. Stock No. 202. Each..... **$9.95**

PUP TENTS

Regulation Army Pup Tents of durable, brown canvas. Used, but in good condition. Fine for campers, outdoorsmen, boy scouts, etc. Worthwhile gift for children. Wgt. 5 lbs.
A-100 Tent only..... **$3.95**
A-110 Tent, New.....$7.95
A-101 Ropes, wooden poles and stakes for above. Per set.....$1.00

Officers Watch Compass

Brand new gov't. surplus. Army-Navy model. Single jewel mounted needle. Silver colored dial. A splendid value. Shp. wgt. 1 lb.
A174—EACH **98c**

CAMERA TRIPOD

Purchased from Gov't. Used but perfect. For cameras up to 8x10 inches. Folds to 32 inches, extends to 58 inches. Needs adapter to mount camera. Wgt. 5 lbs. Stock No. 190. Each.... **$4.95**

ORDER DIRECT FROM THIS AD

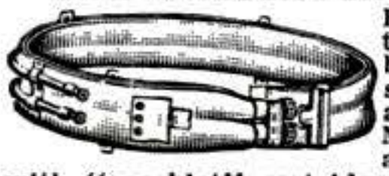
Values galore! Hundreds of hard-to-find items for home, shop and outdoors. Make remittances by money-order, bank draft or personal check. Send 25% deposit on C.O.D. orders. No C.O.D.'s on orders for less than $5.00. Include sufficient postage on parcel-post orders—any overage will be promptly refunded. All quotations F.O.B. Chicago. Used items and materials are guaranteed serviceable and as described. Your money back if not more than satisfied.

BIG ILLUSTRATED CATALOG FREE

STARK'S

Dept. PS647
509 So. State St.
CHICAGO 5, ILL.

LIFE PRESERVER BELTS



Right from the invasion beaches. Consists of two air chambers. May be inflated automatically with "sparklet" cartridges or manually by attached hose. Adjustable in waist size. One air chamber guaranteed air tight—other may need a tire patch. All belts are used and slightly soiled—but a bargain at this low price.
No. 1261. Each..... **$1.00**

SPARKLET CARTRIDGES

May be used with above belts. In boxes of 10. Stock No. 254. Per Box..... **50c**

Copyrighted material

POPULAR SCIENCE Classified Opportunities

Save time—Save Money

Classified Ads only 60c per word per insertion, payable in advance. Minimum ad 10 words. To be included in July issue copy should be in our office by May 28th. July issue on sale July 1st.

POPULAR SCIENCE MONTHLY—351 FOURTH AVE.—NEW YORK CITY 10

12 AUTOMOBILES

"CUSTOM-Styling" Manual — Easily make car look Hollywoodized, custom built, ultra-beautiful! New, simplified custom-izing—restyling—streamlining methods. Instructions, illustrations. Plans for accessories, refinishing, mufflers, model changes—Sport, continentals, convertibles, jeeps, etc. $2.00. Almquist Engineering, 447(J) 64th Street, Brooklyn 20.

RACING Auto Lapel Pins. Non-Tarnishing, colorful, chromed. Identifies your favorite sport. Specify Midget, Indianapolis car, Indian or Harley Motorcycle, or Indianapolis souvenir crossed flags. $1.00 each postpaid. Clymer, Dept. B-63, 2125 W. Pico, Los Angeles 6, Calif.

RACING Car performance for all cars. Increase power, speed. Special "Custom built" equipment. Free literature. Write Lee Motorcraft, 1412-B Great Northern Bldg., Chicago 4, Illinois.

AUTOMOBILE Racing Book. Fifth Edition—Revised. Tells how to build dirt tracks bodies, frames, engines. Records, superchargers, rules, formulas, plans, stock conversions, roadster racing, fast Fords. $1.00 postpaid; $1.15 C.O.D. Ray Kuns Department 274, Madisonville, Cincinnati, Ohio.

"STREAMLINED Roadster"—America's lowest priced car! Small, speedy two passenger sportster! Amazingly easy to build from inexpensive material—small motor. Complete instructions, drawings $1.98. Almquist Engineering, 447-J, 64 Street, Brooklyn 20.

CLYMERTONE Twin Muffler Sets, beautiful sound, complete with necessary welded pipes. E-Z installation. Ford V-8, $20.00. Chevrolet set with split exhaust manifolds, $37.50. Specify car model. Clymer, Dept. B-64, 2125 W. Pico, Los Angeles 6, Calif.

DUALTONE Chrystalline packed mufflers. Single or twin mufflers for all cars. Duals priced complete V8's $23.00. Six cylinders $33.00. Eight cylinders $36.00. Large chromed tailpipe extensions $3.30. Polished carburetor velocity stacks $1.30. Chromed Station Wagon stacks $15.00. Request catalogue. Dualtone Mufflers, 2636B India Street, San Diego 1, California.

HOTROD and fast stock car equipment Heads, manifolds, camshafts, etc. List 25c. Alden Motors, Oakland City, Ind.

MIDGET Racer plans. Blueprint Parts Directory, 50c. Arthur Sibley, Mendon, Mass.

SEE our ad under Motorcycles for midget racer bargains. Midget Motors Directory, Athens, Ohio.

SCOOTMOBILE Roadster! Use scrap parts easily build inexpensive two passenger, three wheeled, small motor Runabout. Also two passenger "Jeep". Complete plans, specifications for both $1.00. Universal, 2671 Algonquin, Toledo 6, Ohio.

SPEED & Mileage manual—Obtain greater speed, mileage, racing performance from any automobile! Includes simplified methods, speed tuning, gas saving secrets —Instructions on building economizers, speed equipment, duals, mufflers, superchargers, racing fuels, fast conversions. $1.98. Almquist Engineering, 447-J, 64 Street, Brooklyn 20.

INDIANAPOLIS "500" Race History Book. 352 large pages, 1100 illustrations. Complete history every race held Indianapolis Speedway since 1909. Tells what happened every race, every hour, every lap. Action photographs, technical details, biographies world-famous drivers. Compiled by Floyd Clymer, this is only complete, authentic book ever published on Speedway. Postpaid $3.50. In red Fabrikoid with gold leaf lettering, $5.00. Book on 1946 race only, 32 pages, 85 illustrations, $1.00. Clymer's complete detailed history 1947 race ready in July. Order now. Postpaid $1.00. Clymer, Dept. B-60, 2125 W. Pico, Los Angeles 6, Calif.

"FORD rear main bearing oil leaks stopped without overhaul. Complete instructions by licensed instructor of vocational auto mechanics $1.50. Martin, 1606 Reynolds, Brunswick, Ga."

SPARKRITE Electronic Coil gives 25% more power, pep, & miles per gallon. Cures Hard Starting. No more dead batteries. One minute to install. Thirty day double your money back guarantee. $5.00 postpaid. Send today! State make, year automobile. Pacific Engineering Enterprises, Box 3030, Los Angeles, California. Dealers wanted. Send for particulars.

AUTO racing magazine subscriptions. Pacific Speedway News, $6.00 yearly. National Speed Sport, $4.00 yearly. Illustrated Speedway News, $4.00 yearly. All give complete data midget, big car race results. Sample copy each 50c. Specify publication wanted. Clymer, Dept. B-62, 2125 W. Pico, Los Angeles 6, Calif.

MAKE your Ford fast! Complete details, photographs. How to construct 120 mph Hotrod, $1 postpaid. California Bill, Box L-2, Eaglerock, Los Angeles 41, Calif.

HENRY Ford, His Life and Work, by Simonds. Complete book on the life of a great American. 384 pages, 75 illustrations. Fabrikoid binding, gold lettering, postpaid $4.00. Clymer, Dept. B-61, 2125 W. Pico, Los Angeles 6, California.

"BUILD speedy Midget Track Racer from castoff parts! Plans, specifications, construction information. $1.00. Motor Supply, Box CS-1682, Toledo, Ohio."

CUSTOMIZE your automobile. Illustrated new restyling ideas, instructions, specific model changes by simple methods. $1. Speed-wheel, Box 723-C, Arcadia, Calif.

USED-Car Handbook. "Judging the Used Car." Dealers' tricks exposed, comprehensive simple tests, photographs. Postpaid $1. Truvalu, Box 723-C, Arcadia, Calif.

HOT-ROD Manual; plans, photos, instructions, fast Fords. $1.50 P.P. Racing parts list. 10c P.P. Hollywood Hot-Rod, Box 9626S, Los Feliz Sta., Hollywood 27, California.

"WATER Injection" for Automobiles, Trucks, Tractors—only $2.00. Convert your own engine to "Burn Water". Diagrams, Details, Instructions—$2.00 postpaid. Newhouse Industries, 5941 Hereford Street, Los Angeles 22, California.

CLYMER'S Historical Motor Scrapbook No. 4. Ready June. Latest Clymer book old cars and motorcycles. Postpaid, De Luxe Edition, $2.50. Clymer, Dept. B-68, 2125 W. Pico, Los Angeles 6, Calif.

13 AUTO SUPPLIES & EQUIPMENT

HAVING Car Trouble? New, Used, guaranteed auto, truck parts save money. Transmission specialist. Describe needs; immediate reply. Victory, 2930¼ No. Western, Chicago 18.

AUTO parts for all autos and trucks. Trans, motors, differentials, fenders, carburetors. Also Body Parts. Security Auto and Truck Parts, 1941 BP Eddy, Chicago 13.

MANIFOLD Whistle — Imitates "Wolf Whistle", Barking Dog, Siren, Etc. Connects to any car manifold. Complete installing instructions. Send $6.00 to Protecturod Company, 4033 Windsor #5, Youngstown 7, Ohio.

GRILLES for most all cars. Meyers Auto Parts, 820 Dryades, New Orleans, La.

BURN water in your car. Costs less than gas, more power: Cleaner motor. Mail card for data on $17.50 Octa-Gane Water injecting Carburetor. Ralph A. Shade, 563 Lake Road, Webster, N. Y.

NEED Auto Parts? We have them. New and Rebuilt. Prompt Shipment. Write Requirements. Save Money. Buy Direct. Factory Warehouse. Mechanics Auto Parts, 3807-A North Ashland, Chicago 13.

MUFFLER manual. Convert easily to Hollywood, Laguna, Westwood, duals, etc. Includes construction details, regulations, diagrams. Postpaid $1. Mellotone, Box 723C, Arcadia, Calif.

OIL Pumping Motors—brought back to normal without ring job. Send address on Post Card for Free details. Mullner Co., Box 3102, St. Paul 1, Minn.

TIRES—All standard makes at wholesale prices—Direct Tire Co., 962 E. 129 St., Cleveland, Ohio.

"TRIPLE stitched automobile seat covers made with beautiful plastic two-tone leatherette. Dealers wanted. Mono Auto Seat Cover Co., 6545 Santa Monica Boulevard, Hollywood 38, California."

1947 SUPERIGNITIONITER $5.50 Atomic Starting, pep, mileage. Special $5.00. EG Mfg., 355-B East 149, New York 55.

14 AUTO TRAILERS

BUILD your own Trailer! Save Money! Have every feature you want! Plans for House, Sport, Camp and Utility trailers. Catalog describing 9 models 10c. (15c in Canada and overseas). Jim Dandy, Box 125-B, Wausau, Wisconsin.

91 MOTORCYCLES, BICYCLES, SUPPLIES

LARGE stock Indian parts. Expert motor rebuilding. New and rebuilt Chief Motorcycle, motors only. Indian Motorcycle Sales, Kansas City 1, Mo.

WHEELS, Tires, Tubes for Motor Scooters, Midget Cars, Wheelbarrows, and Industrial equipment. All sizes. Bicycle Parts, accessories. **Largest stock in United States. Send dime for list. Cycle Transport Company, 1241 S. Michigan Ave., Dept. C, Chicago 5, Illinois.**

1½ HORSEPOWER from Y and similar Briggs and Strattons. Instructions $1.00. Parts, Transmissions. Alden Motors, Oakland City, Indiana.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

"CUSHMAN motorscooter $15. Shaw bicycle motor $15. Harley-Davidson Motorcycle $35! Send 25c for bargain catalog #8, just off the press, packed with money saving buys in motorscooters, motorbikes, midget cars, motors, wheels, tires and parts. Gail and Company, 538 Erie, Toledo, Ohio."

WHEELS! Build wagons, scooters, mowers, trailers, wheelbarrows, grocery carts, baby carts, play pens, baby carriages. 4" to 16". Free list. Trulsen Mfg. Co., 811 E. 31, Kansas City, Mo.

BRIGGS and Outboards, cheap. Send Dime. Paco, 1252 Thurman, Camden, N. J.

"BUILD America's lowest priced motorscooter speedster! Complete plans, specifications, $1.00. Big list bargain priced used motors, etc., included free! Motor Supply, Box 1682-CS, Toledo, Ohio."

CLYMER'S Motorcycle books. Speedway Motorcycle Racing, $2.00. Motorcycle Speedway Annual, $1.00. How to Manage Motorcycles, $1.50. Motorcycling Manual, $2.00. How to Obtain Speed, $1.50. Motor Scooter Plans, $2.00. Books on Ariel, BSA, Norton, Triumph, Villiers engines, $1.50 each. English Motorcycle Magazine, 50c. All postpaid. See our ad automobile section. Catalog free. Clymer, Dept. B-66, 2125 W. Pico, Los Angeles 6, Calif.

"PROFESSIONAL Midget Racer, Motor-scooter, Midget Roadster, and Midget Motorcycle. Plans, specifications for all four contained in illustrated handbook, 25c. Big list bargain priced used motors, motorscooters, Servicycles, etc., included free! Midwest, 3839 Drummond, Toledo, Ohio."

MOTOR Scooters, bicycle engines, 120 miles gallon. Dime for catalog. Clymer, Desk B-65, 2125 W. Pico, Los Angeles 6, Cal.

WHEELS, Steel Disc rubber-tired for toys, wagons, scooters, etc. Sizes 5", 6", 7", 8", 10" available. United Wheels Mfg. Co., 11727 La Fayette Ave., Chicago 28, Ill.

MOTORCYCLE (miniature) lapel pins. Exact duplicates favorite 1947 model. Chromed, colorful, non-tarnishing. Specify Harley, Indian, BSA, Norton, Triumph or Ariel, or Daytona race souvenir crossed flags, $1.00 each, postpaid. Midget or Indianapolis racer same price. Any above pins on attractive tie-clasp, $1.25; tie-holder, $1.75. Postpaid. Clymer, Dept. B-67, 2125 W. Pico, Los Angeles 6, Calif.

MOTORS for bicycles and motorscooters $3 up; Motorscooter frames less motors $5 up; factory built motorscooters as low as $35, complete; motorcycles $25 up; plenty of new 2 h.p. motors in original factory crates. Brand new motorscooters and midget cars ready for delivery now. Over 6000 balloon tires for motorscooters and midget cars $1 up. Mail order only. Send 25c for Big War-Bargain catalogue Number 19, just out listing the above and hundreds of other bargains in new and used motors, motorscooters, midget cars, racers, etc. (35c by First Class Mail). Midget Motors Directory, Athens, Ohio.

HARLEY-Davidson Parts, Accessories, Batteries, Tires, and Repair work. 24 hour Service. Authorized factory dealer. Philadelphia Harley-Davidson Company, 857 North Broad Street, Phila. 23, Penna.

"CUSHMAN Motorscooter $20 (includes motor and extra tires). Midget Racer $15! Send 25c for big Summer catalog #938, just printed, listing these and scores of other sensational bargains in motors, wheels, motorscooters, motorbikes, Servicycles, tires, etc. Associated, Box CS-1764, Toledo, Ohio."

"MOTORSCOOTERS 1947 models. Immediate delivery. Send 10c for illustrated catalogue. Johnsons' Motorscooter Sales Co., Milford, Ind."

"POWER Lawn mowers now available. All aluminum. Cuts grass 3 feet high. Literature free. Dealers invited. Johnsons' Motor Sales, Milford, Indiana".

15 AVIATION

CAREER Counselor. Guidance for beginners. 23 years aviation experience. George Miller, 1333—18th Street, Santa Monica, Calif.

AIRLINE employment interest you? Write for helpful, free information. Air Transport Research, Dept. E, Box 1044, Kansas City 10, Missouri.

LEARN Aviation—300 Page Illustrated course $1.50. Craig Dare, 140 W. 42nd, N. Y. 18.

"CUBS, Wacos, Taylorcrafts, Aeroncas. Big catalog 25c, lists these and thousands of other sensational airplane bargains. Some are "easy to repair" crackups. National, Box 1682-CS, Toledo, Ohio."

VETERANS: Flight training under the G.I. Bill. Private, Commercial and Flight Instructor Ratings. Write for information. Gottschalk School of Aeronautics, Adrian, Michigan.

BUSHEL Basket of damaged Aircraft instruments, our choice, $24.94. No COD's. State Express or Freight. Aero Instrument, Municipal Airport, Houston, Texas.

4 AVIATION INSTRUCTION

TRAIN For Aviation Mechanics High Salaries. This famous school approved for veterans. Immediate enrollment. For information write California Flyers, Department P-6, Inglewood, California.

49 ELECTRICAL SUPPLIES & EQUIPMENT

ELECTRIC Fan. Assemblies counter models, floor models, attic fans. AAlco Electric, 1430 Franklin, Saint Louis 6, Missouri.

ELECTRIC Pencil: Writes, Engraves all Metals. $1.00 postpaid. Beyer Mfg., 229-C Dixson Blvd., Uniontown, Penna.

FANS, irons, clocks, motors, toasters, radios, etc. Jeanette Electric, 159 West 23rd St., N. Y. 11, N. Y.

HOUSEHOLDERS Attention: Repair your own electrical equipment. Detailed instructions on motors, fluorescent lamps, etc. 50 cents E. W. Lutz, 182 W. Como Ave., Columbus 2, Ohio.

MOTORS, 1/12 H.P. $9.00, 1/6 H.P. $12.50. Exhaust fans 16" $24.50, 20" $28.50, all 110 volts, 60 cycle. Vic's Electric, 94 Chenango, Buffalo, N. Y.

"VACUUM Cleaners—New and Rebuilt—Nationally Known Makes — Wholesale Prices—$12.00 and up. Re-New Sweeper Co., 9591A Grand River, Detroit, Mich. Established 1916."

SELSYN motors, Bendix 3½" x 5½" heavy duty 115 volts, 60 cycles, $10.25 per pair. J. A. Weber, 150A Maple, Hershey, Pa.

THERMOSTATS — special 40c — 3 for $1.00—capsule type—over 600 degree adjustable range—not calibrated—cap. 40 watts—dozens of experimental uses—outfire control—limit control—low temp. control. A.C. Voltmeters—Triplett license—0-150—new—3½"—Bakelite—white dial—special $3.45. A.C. Ammeters — 0-100 — same as above—only $2.95—Postpaid. Send check or postal order. D. E. Kitchen, Logan, Ohio.

LAMPS—All parts to build or repair. Catalog 10c. Gyro, 5416 Clark, Chicago 40.

WASHING Machines. Parts all makes. Northeast Burner, 1358 H Street, Washington 2, D. C.

ELECTRIC Pencil—writes, engraves all metals. Battery model $1.00—110 volt model $2.00 postpaid. Guaranteed 5 years. C.O.D.s accepted. Reb Industries, Dept. 265-Y Elmhurst, Illinois.

MANUAL On multispeed three phase induction motors $2.00 free literature. Electric Generator Mfg. Co., 1333 N. Dale St., St. Paul 3, Minn.

"GAS-MIZER" — America's finest hot water system. Dealership opportunities available. Safety Control Company, 2519 Wilson, Arlington, Virginia.

TWO Alnico V Magnets ¼" x 2" $1.00. 1947 list Free. Terry Sales Company, 3726 South Detroit Avenue, Toledo 9, Ohio.

FLUORESCENT fixtures. Factory prices. Free catalogue. Naturalite, 1520 Ardmore, Chicago 26.

ELECTRIC fan assemblies. Assemble your own. Ted Riseman, 207 North Fifth, Springfield, Ill.

140 WELDING, SOLDERING

GUARANTEED new, heavy-duty, industrial, portable 110/220v AC arc welders for farm, garage, repairs, industries. $35.00 to $245.00. Free illustrated literature. Williams Company, Box 4100, Portland 8, Oregon.

NEW Model electric welder 110 volt AC-DC; will weld all metals; easy to use, full directions. Complete with power unit, flame and metallic arc attachments, carbons, fluxes, rods, mask; all for $19.95—Used by the Navy. Magic Welder Mfg. Co., 239-PS—6 Canal St., New York City.

WELD, Cut, Braze with gasoline! Amazing new discovery shatters costs. Boosts profits. Important! Write Matthews Mfg. Co., Calgary, Canada.

WELDERS (Acetylene) Double present income welding White Metal ("Pot") using your own rod made from scrap. LaCombe, Oakland S-6, California.

ACETYLENE Welding Generator, popular, safe, 15 lbs. carbide, portable, make it, save $90.00. Print and Layout $5.00. Haywood Generator Co., Box 1325, Brownsville, Texas.

80 MACHINERY, TOOLS, SUPPLIES

WAR Surplus in small tools for machine shop—Send 10c for bulletin. Travers Tool Co., Dept. S, 5 Court Square, Long Island City 1, N. Y.

SHEBEL Saw Filer, $7.50. Files all saws. Free trial. Circular. 730A So. 2nd St., Milwaukee 4, Wis.

GEARS For inventors, experimenters, model makers, schools, work shops, laboratories, etc. Government surplus made of brass, bronze, dural steel and stainless steel. 12 matched pairs; 24 gears, bevel, spur and ratchet. List price $12.00, our price $2.50. 25 matched pairs; 50 gears, includes larger gears, also sets of worm gears. List price $30.00, our price $5.00. Limited quantity. Order now. Write for our bulletins on ball bearings, rectifiers, Relays, Selsyns, Horns and government surplus materials. Met Exchange, 323 Canal Street, New York.

BRASS parts made to order on automatic Lathe. Send pencil sketch for price and delivery. G. K. Heller Company, Baltimore 23.

WORK wanted for hand Turretlathes. Glenbern Machine Co., Youngwood, Pa.

TANKS, Stainless Steel, 9 gallon capacity. 12" diameter 24" long. Rated strength: 400 lbs. per square inch internal pressure. Ideal for air compressor, rustproof tank for boat or camp. Write for details and "How To Make It" free. Surplus bargain at never-again price of $8.00, fob Ireland and Vice, 48 Chedel Place, Auburn, N. Y.

HOISTS, surplus Spur Gear Hand Hoist will lift 500 pounds 20 feet. Made by famous manufacturer to lift bombs into aircraft. Easy to install and operate. New . . . unused. Shipped postpaid anywhere in U.S.A. for $10.00, or write for illustrated details and dozen uses. Hurry! Ireland and Vice, 48 Chedel Place, Auburn, N. Y.

CONCRETE Building block machines and molds. Catalog free. Concrete Mold Co., 5127 South Compton Ave., St. Louis 11, Missouri.

IT'S Easy to build your own metal and woodworking tools from Lewis castings. Materials and blueprints—and at savings up to 80%! Lewis mills, shapers, drill-presses and other shop tools have ample capacity and performance for home workshop jobs. New catalog sent on receipt of 10c to cover mailing—describes 23 Lewis tools. Address Lewis Machine Tool Co., 3217 Union Pacific Ave., Dept. S, Los Angeles 23, Calif.

LABEL your cigar boxes for tools, hardware, screws, nuts, bolts, washers, electrical parts, machine parts, etc. Send postcard for bulletin No. 108. Hinds Mfg. Co., 223 Second, Niagara Falls 2, N. Y.

AIR Compressors, electric, 3-stage. Value over $200.00. New 27-volt AC-DC. Convert Easily with transformer. Weight 28 lbs. wrapped in pliofilm and boxed. Instructions free. A real buy $15.00. Immediate delivery. Write for quantity prices. General Surplus Stores, Dept. CS6, 1439 Grand Ave., Kansas City, Missouri.

TRANSFORMERS New . . . Convert General Electric and Cornelius Aircraft Air Compressors 27-volt, 20-amp AC-DC to 110-volt. Immediate delivery. $14.50 each FOB. General Surplus Stores, Dept. SP1, 1439 Grand Ave., Kansas City 6, Mo.

Copyrighted material

PROPELLERS—We specialize in ice-snow sleds and boats. Either 2 or 3 blade. Illustrated literature. Standard Aerocraft, Ft. Worth, Texas.

TAPS & Dies direct from manufacturers. Equip your shop at small cost. Write for free price list. King Tap and Tool Co., Inc., North Attleboro, Mass.

CORONA 7" shaper attachment fits all lathes, does any job a small shaper will do. $18.62. Also other attachments. Free circular. Corona Tool Co., Dept. S, 107-15 51st Avenue, Corona, New York.

WAR Surplus, Machines, Tools, etc. Free literature. Wayne Engineering, Greenville 2, Ohio.

FILES—New 6" to 18". Assorted shapes $1.00 Dozen. D & H, 1362 College Ave., Bronx, N. Y.

INDEX Heads for sale. Very inexpensive. Sixty-two different Divisions. Used on lathes up to twenty " swing, drill-presses, milling machines, etc. Make gear, hobbs, cutters, etc. Very accurate and durable, used by shops, factories, and machinists. Write for free folders. Long's Index Head, 2117 East B Street, Torrington, Wyoming.

V BLOCKS at low prices. 10 sizes for all purposes. Free Literature. Miles Products, 2532 Wabash, Chicago 16.

PROPELLERS for Ice-snow sleds, air boats, catalog 10c. Banks Propellers, R.F.D. 12, Ft. Worth, Texas.

CIRCULAR Saws $1.00 each. Approx. 6". Used but good condition. ½" center. Postpaid. Jermin, R. 6, Box 97, Mt. Clemens, Michigan.

1,000 POSITIONS at the twist of a wrist! The cleverest, handiest, and most Universal Bench vise is now in Production. Write Arrow Metalcraft Co., 1519 Riverside Drive, Los Angeles 31, California.

HOISTS for roofers, contractors. Mitchell Engineering, 6430 Evans, Chicago 37.

CAST aluminum hand protector for jointer. Plane any thickness over ⅛". Improves workmanship, eliminates ripples. Makes jointer safe as hand plane. A separate tool. $2.85. Safety Manufacturing Co., 234 Sunset Ave., Ridgewood, New Jersey.

WATCHMAKERS Lathes, Millers, Chucks, Headstocks, Compounds. Machine Service, Newfane 1, Vermont.

DRILL Grinder for twist drills $2.95. See ad on page 261.

19 BOATS, OUTBOARD MOTORS, ETC.

FULL size, cut to shape boat patterns, blueprints, 7½—38 feet. Illustrated "Build a Boat" catalog, 10c (coin). "How to Build Boats" book, $1.00. Cleveland Boat Blueprint Co., Dept. A-77, Cleveland, Ohio.

MARINE Power—Easily convert any Ford and Jeep motor (domestic and foreign) with Osco parts and kits. Complete catalogue 25c (coin). Osco Motors Corp., 2020C E. Orleans St., Phila. 34, Pa.

WHY lug your outboard motor? New easy carrier $8.75. Catalog free. Sportsman's Pal, Tahoe Valley 4, Calif.

ANCHORS navy type, sizes 10-15-20-25-30 lb. Semi-steel, aluminum finish. Recommended size, 1 lb. per ft. Price 20c lb. f.o.b. Wilson Patterns, Coffeyville, Kansas U.S.A. Discount to dealers.

"MARINE conversions for Ford and Jeep engines. Catalog 10c. Lehman Manufacturing Company, Department A, Newark 2, New Jersey."

PLYWOOD Boat Kits! Complete materials for building "Deltacraft," "Junior Dinghy," "Tadpole Skiff." Mahogany marine plywood and oak construction! Send 10c today for illustrated folder featuring these Boat Kits and other marine materials and supplies. Carmen-Bronson, Marine Department, Mount Vernon, N. Y.

NEW, used, rebuilt marine motors. Marine conversions, fittings. Free Catalog. Stokes Marine Supply, Dept. 23, Coldwater, Mich.

CARTOP Rowboats, Kayaks. Weldwood ready cut kits. Booklet. E. J. Croot Co., #103-E, Basking Ridge, N. J.

KAYAK Blueprints. Deluxe Models—catalogue 10c. Viking Kanoes, Merrick, N. Y.

SPORTSMEN! Build Kayak from easy-construction kit! Literature. Kayacks, Dedham, Mass.

MARINE Plywood. Phenol Resin glued, made to U. S. Navy specifications for PT boats, ¼" thick, 3 ply. Mahogany on two sides, some with Mahogany centers, 3' x 8', 3' x 6' sheets. 34 cents square foot. FOB Chicago. Beck Plywood and Lumber Co., Inc., 617 W. Division St., Chicago 10, Ill.

SPORTSMEN!—Build wonderful foldcraft Kayak. Plans for 10½' or 15'. Rush $1.00 today. Hoosier House B-2, P. O. Box 1264, Indianapolis 6, Indiana.

51 ENGINES, MOTORS, ETC.

"BUILD Your Own" gas drive arc welder easily with Hobart Generator. Save $300 to $500, and need only add used auto engine and chassis to build portable gas drive welder that goes everywhere after profitable construction and repair jobs. Write for free instruction book, further details. Hobart Brothers Co., Box P-1066, Troy, Ohio.

WINDING Data, listing 225 motors, single and three phase, $1.00. Motor Data, Box 7631 Kansas City 3, Mo.

150 AMPERE Generators for welding $47.50. Extra Flexible Cable, 6 ft. lengths $2.75. Other Bargains. Butler Electric Company, 1885 Milwaukee, Chicago 47.

ELECTRIC Motors 110 Volt AC-DC ⅛ horsepower 8000 R.P.M. (Reconditioned) Marvelous Value $6.50. Limited Quantity. B. Price, 1394 Fulton Avenue, Bronx 56, New York.

7 AMERICAN POLICE JIU JITSU

DEADLY Judo—Fiercest fighting technique. Trick knockouts. (200 photographs—plus illustrations.) Expert instructions—Three volumes. Complete $2.25. Variety House, Box 46-AR, Wall Station, N.Y.C. 5.

20 BODY-BUILDING COURSES

BAR-BELLS, Dumbbells, Exercise equipment, Courses, Free booklet. Good Barbell Co., Reading, Penna.

BARBELLS! Catalog! Bur Barbell Co., 319 Orient Way, Lyndhurst, N. J.

1947 NEW Low Prices. Burgo Barbells, 405 Martinique, Dallas 10, Texas.

BOWLEGS, straighten them simply, easily, and quickly. Different, successful, system. Hutson, Box 54, Oakfield, N. Y.

ACROBATICS — handbalancing, self-taught. Write. Power, 923 W. Vine, Kalamazoo, Michigan.

124 SPORTING GOODS, GUNS, FISHING TACKLE, ARCHERY

"AMMUNITION"—"New and Used"—"Shotguns" — "Rifles" — "Revolvers" — "Pistols" — "Fishing Tackle" — List 10c. Rudolph's, Atchison, Kansas.

5000 BARGAINS, firearms, binoculars, war relics, catalog 40c. Smith Museum, Runnemede, N. J.

BOWS-Arrows. Write headquarters for Archery equipment. Quality products. Popular prices. Catalog 10c. Large illustrated Hand Book Instructions, making and shooting, 50c. Archery, 617-A So. State, Chicago 5.

SEND 10c for list 100 new and used guns. Frayseths, Wilmar, Minnesota.

SPORTING Goods. Free Catalog. Dare Company, 140 W. 42nd, N. Y. 18.

BASEBALL Fans—for $3.00 make this new pitching device. Practice batting in back yard. Duplicates curves. Delivers regulation baseball every 5 seconds. No Fielding. Plans $1.00. A. Rankin, Route 4, Hagerstown, Md.

SPORTSMEN! Build Kayak from easy-construction kit! Literature. Kayacks, Dedham, Mass.

"1001 FISHING Secrets" Baits; Lures; Chums; Worm Surfacer — "Everything". Rush $2.00 Details Free. Modern Angler, Covington, Kentucky.

6 VOLT Hand Lantern. Streamlined stainless-steel case, lense, reflecter. Size 11" x 4" x 3". Perfect for fishermen, hunters, autos, bicycles. Regular $9.95. Now, $2.95 postpaid (no COD). Aero Parts, Municipal Airport, Houston, Texas.

"GLO Lite" Bobber Release—allows bobber to slide free on line when the fish bites—35c postpaid. Glo Lite Bobbers, 2111 Woodward Avenue, Detroit 1, Michigan.

ILLUSTRATED Catalog 25c.—"History: Antique Firearms" booklet 35c. Rare Cartridge list 12c—$40,000.00 Indian Relics list and Photographs 25c. Heike, Wenona 15, Illinois.

55 FIELD GLASSES, TELESCOPES, ETC.

REFLECTING Telescope, complete 3½" diameter, equatorially mounted. View planets, stars, $19.75. Write Skyscope Co., 475-5th Ave., New York.

60 POWER telescope, $2.95. 250 power microscope, $2.45. Send for free catalog of Telescopes, Binoculars and Microscopes. Brownscope Company, 24 West 45th Street, New York.

GENUINE polaroid mounted in optical glass, 3" (72mm) discs perfect for every use in photography, physics, petrology, chemistry, etc. $1.25 each or 2 for $2.00 postpaid, also 1" (25mm) diameter 60c each or 2 for $1.00. Ross, B-68 West Broadway, New York 7, N. Y.

REFLECTING Telescope Kit, complete optical parts, fully finished 3" diameter 39" F.L. mirror and diagonal both hard aluminized plus 3 lenses for high power eyepieces. (Never again a bargain like this). All $6.00 Postpaid. Ross, B68 West Broadway, New York, N. Y.

TELESCOPES, Microscopes, binoculars, barometers, books; Buy, sell, repair; We guarantee. Lists 10c. Rasmussen & Reece, Amsterdam, N. Y.

4000X COMPOUND microscope easily made. Lenses and instructions $3.00. Instructions alone 10c. Carl Jamer, Manorville, New York.

PERFECT lenses and instructions for making astronomical telescopes. 100X $2.50. 200X $3.50. 400X $5.50. Instructions alone 10c. Carl Jamer, Manorville, N. Y.

GIANT 100 power astronomical telescope complete with 6' tripod. Full power, clear vision guaranteed. $12.50. Carl Jamer, Manorville, N. Y.

43 DOGS, BIRDS, PETS, RABBITS

ANGORAS, Chinchillas, White Giant Rabbits — "Rabbitry Management" tells everything, $1.00. Self-cleaning Hutch plans $1.00. Automatic Feeder plans $1.00. All three $2.50. Catalog finest Pedigreed Rabbits free! Grinsteads, Dept. 16-D, Edwardsville, Ill.

RAISING Rabbits, Cavies, Hamsters, Chinchillas is a growing and profitable industry. Magazine 10c. Descriptive Book and magazine 25c. Book and magazine (monthly) one year $1.00. Address Small Stock Farmer, Pearl River 16, N. Y.

GUARANTEED Chin-Chin Giant Chinchilla rabbits. Greatest amount of delicious meat. Largest, finest, most valuable furs. Tremendous demand for breeding stock. We buy youngsters. Contact world's largest breeder. Willow Brook Farm, R16, Sellersville, Pa.

$250 MONTHLY. Raising Angora Rabbits. Particulars free. White's Rabbitry, Newark, Ohio.

REAL Giant Chinchilla Rabbits. Offered by their originator. Free details. Stahl, Pearl River, N. Y.

$2500 EASY raising angora rabbits. We market your output. Contract particulars free. Wilson's, 1065 Shryer, St. Paul 8, Minn.

RAISE Diamond Seal Rabbits. We pay $30-$60 each. Small Investment. Continuous market. Prices guaranteed. Prefabricated hutches $6. Illustrated literature 25c. with hutch plans $1.00. Completely automatic. Hansen's Rabbit Institute, 1347 Miller Ave., Salt Lake City 6, Utah.

FOR Sale — Coonhounds, combination treehounds and high class foxhounds. Rabbithounds a specialty. Raccoon Mountain Kennels, Dures Thomas, Rt. 3, Albertville, Ala.

BRASS Dog Tags stamped with your name, address, phone. 25c; 5 for $1.00; 12 for $2.00. Links free! Agents Wanted. Artco, Dept. 301-F, P. O. Box 1594, St. Louis, Mo.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

RAISE Guinea Pigs. Make money at home. Big demand. Booklet free. Taylor, Box 426B, Hapeville, Georgia.

ST. BERNARD Pups: Champion sired beauties. Franklin Young, R. 3, Riverhead, Long Island, New York.

"GUARANTEED pedigree giant chinchilla rabbits. Very profitable business. We buy all youngsters you raise at the highest prices. Tremendous demand for meat, fur, breeding and laboratory stock. No experience necessary, requires little time and space. Free information. Garver Fur Farm, P. O. Box 187, May's Landing, N. J."

RAISE Golden Hamsters for fun and profit. $5 pair. Hathaway, 609 Deerfield, Silver Spring, Maryland.

83 MILK GOATS

"MONEY from dairy goats!" Booklet free. Introductory 3-month subscription to leading magazine 25c. Dairy Goat Journal, Dept. 768, Columbia, Missouri.

52 FARMS, OTHER REAL ESTATE

OZARK Lands for All purposes. Actual river frontages. 5 acres $90.00 and upwards. Free list and literature. Hubbard, 424H, Minnesota Ave., Kansas City 4, Kans.

GOOD Farms—Ranches, Washington, Minnesota, Montana, Idaho, Oregon, North Dakota. Dependable crops, favorable climate. Write for literature, lists describing typical postwar farm opportunities. Specify which state. J. W. Haw, 120 Northern Pacific Ry., St. Paul 1, Minn.

STROUT'S Green Farm Catalog—Over 2500 Bargains—money-makers—32 states—Coast to Coast. Mailed Free. Tell us what you want. When? Where? Price? Terms? We will try to save you Time & Money. Strout Realty, 255-ZB 4th Avenue, N. Y. 10, N. Y., 20 W. 9th St., Kansas City 6, Mo., 453 S. Spring, Los Angeles 13, Calif.

WANT A Farm Of Your Own? Good ones are available in Canada at comparatively low prices. Favorable terms. Why not write for information today? Indicate the kind and size of farm, and the province in which you are interested. Address inquiry to H. R. Cresswell, Canadian Pacific, Montreal.

HOMESITES $450—convenient payments. California's finest garden section. On Morro Bay's scenic shores. Wonderful fishing, hunting, boating, bathing. Fertile soil, softest water, temperate climate, congenial community. Free literature. Richard Otto, 6560-Z, Hollywood Blvd., Hollywood 28, California.

FOR SALE 630 A. Bluegrass Cattle Grazing Land Running Water Warren County, Virginia $25.00 per Acre. Claude L. Rust, 306 South Royal Avenue, Front Royal, Virginia.

FARMS free list Dairy Chicken Muskrat, Timber Lands, R. J. Sheehe, Broker, Arcade, N. Y.

108 POULTRY AND SUPPLIES

RAISE turkeys the new way, write for free information explaining how to make up to $3000.00 in your own backyard, address National Turkey Institute, Dept 57, Columbus, Kansas.

111 PROFITABLE OCCUPATIONS

DETECTIVES Earn Big Money. Excellent opportunity. Detective Particulars free. Write, Wagoner, P-125 West 86th, N. Y.

WELDING—Electric Arc. Learn profitable trade quickly through actual practice. Individual welder instructions at bare cost of materials. Full particulars free. Valuable welding lessons book 50c. Hobart Welding School, Box P-1064, Troy, Ohio.

LOCKSMITHING — Profitable Business or Hobby! New course teaches you how to pick locks, fit keys, de-code, masterkey, etc. Easy self-instruction lessons. Bargain price. Fascinating 100-page illustrated catalog Free! Write Nelson Company, Dept. 2-01, Chicago 5.

MUSHROOMS Grown. Boxes, Barrels; Illustrated Instructions, 50c. Spawn $1.00. Gordons, 553 William, Winnipeg, Manitoba.

$40.00 WEEKLY. Made growing mushrooms. Fresh. Dried. Dominion Patent 331,583, free spawn. North American, 169Y Yonge, Toronto, Canada.

MAKE beautiful costume jewelry at home for large profits, hobby or therapy. Free illustrated wholesale catalogue of sea shell, metal and plastic parts contains detailed instructions. Florida Supply House, Bradenton, Florida.

"CASH in on hard water in your community. Complete instructions $1.00. Mr. Clevenger, 6342 S. Loomis Blvd., Chicago 36, Ill."

START Back Yard, Perennial Plant Business much more Profitable than Ginseng. Instructions $1.00. Richland Gardens, Martin, Tennessee.

SHELL jewelry, ash trays, dolls and many other shell novelties are easy to make at home. Beginners' shell kit with instructions only $1.00. Catalogs listing over 100 varieties of shells and findings such as ear screws, pinbacks, plastic cameos, crosses, plywood plaques, etc. sent for 5c. refundable. Burton, Box 27, Sta. A, St. Petersburg, Fla.

SHELL lamps for fun, profits. $1.25 brings postpaid complete kit, instructions, including beautiful imported shell. Easily make lamp retailing to $3.00. Southern Importing, Box 1685, Riverside Station, Miami 35, Florida.

EARN Money At Home With Typewriter! Addressing Envelopes, Circulars, Typing. 25c brings details also 68-Page Book of Moneymaking Opportunities. Ace-10, Box 183, Birmingham, Alabama.

SEASHELL Jewelry and Novelties easily made. Fascinating Hobby or Home Industry. Illustrated instructions, catalog 10c. Frissells, Dept. G, 4627 Woodside Drive, Houston, Texas.

NOVELTY Manufacturing at home is profitable. New flexible molds available. Metz, 708 Ivy St., Pittsburgh 6, Penna.

REBLUE Guns, factory grade. Complete outfit $9.95. Gunblue, Fletcher, N. C.

MAKE beautiful mirrors from inexpensive window glass. No special equipment required. Details Free. Tes-Co., Box 189-SE, Wilkes Barre, Penna.

METALLIZE Baby shoes for big profits. Several methods $1.00. Tes-Co, Box 189-SF, Wilkes Barre, Penna.

$5000, from half acre growing Ginseng, seed supplied. Crop bought. Particulars 10c. Associated Growers, 203 Bulman Block, Winnipeg, Canada.

LEARN Arch Support Making. Profitable. Fascinating Profession. Six Weeks Course. Tunis System, 3041 S. Double Drive, Temple City, California.

MAKE flexible molds! Few cents each! Cast plaques, novelties, bookends! Free sample! H. Tooker, Hamilton 19, Ohio.

SEA Shell Jewelry. Free instruction. Werts, 1429 56th Avenue, Oakland 3, Calif.

LEARN Mold Making Plaster Casting. Materials furnished. Particulars Free. Saco, 117½ W. Grand, Oklahoma City 2, Okla.

CUSTOM Made jewelry, profitable hobby or business. Copyrighted laboratory manual starts you working with precious metals. Designing, pattern making, casting by proven methods using simple equipment. $1.00 refundable in seven days if dissatisfied. Hobby Craft Research Bureau, Suite 312-B, Guaranty Bldg., 6331 Hollywood Blvd., Hollywood 28, Calif.

22 BOOKS, PERIODICALS, ETC.

WHAT Every Mason wants. We have Masonic books for Blue Lodge, Chapter, Commandery Scottish Rite and Shrine. Our rituals are used the world over. Send for our free catalog of books and rituals for Masons, Odd Fellows, Knights of Columbus, etc. Ezra A. Cook, Publisher, Inc., P.O. Box 796-RMY, Chicago 90, Ill.

MAGAZINES (back dated)—foreign, domestic, arts, Books, booklets, subscriptions, pin-ups, etc. Catalog 10c. (refunded). Cicerone's, 863 First Ave., New York 17, New York.

GOOD "Used" Self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Company, Chicago 5.

BIG Profits Taking Subscriptions For All magazines. Agents' Confidential Catalog listing over 2500 periodicals and complete starting supplies Free. Pines Subscription Agency, Flushing, N. Y.

BOOKFINDERS! (Scarce, out-of-print unusual books.) Quickly supplied. Send wants. Clifton, Box 1377-PS, Beverly Hills, Calif.

EDUCATIONAL Books sold cheaply or rented for small fee. Books bought. Money-back guarantee. 4,000 Bargains. Catalog Free. (Courses Bought.) Lee Mountain, Pisgah, Alabama.

NATIONAL Geographic Magazine, 1888-1946. Any issue. Periodical Service, Box 327-S, Swarthmore, Penna.

ADULT Books 25c. Five—$1.00! Free Bookalogues! Hirsch, Spring Valley 3, N. Y.

BOOKS! (out-of-print, scarce); quickly supplied. Send Wants. Spotlight, 141 Broadway, New York.

MAGAZINES—Business, Vocational, Diversion. Current single copies. Choice over 850 periodicals. All fields. Free price-list. Commercial Engraving Publishing Co., 34S North Ritter, Indianapolis 19, Indiana.

BACK-Date Magazines, Books. Specific issues—years. Arkell's, Tarzana, Calif.

WORKING with Plexiglas 72 page fully illustrated manual $1.50 postpaid. Kosto, Washington 7, D. C.

ATOMIC Energy for the Non-Physicist by the Science Editor of the New York Herald Tribune. Cardboard-bound edition only $1.00. Rubin, 1749 Grand Concourse, New York City.

YES: We are again accepting agents to handle magazine subscriptions, books, greeting cards, complete details 25c (refunded). Cassell Publishers Service, Westfield, New Jersey.

BOOKS on Horse Racing $1.50 and $3.00. Both, big value—only $2. Satisfaction guaranteed. Free literature—Write Charles Hall, Sepulveda, Calif.

YOUR Health! Life is not life without health! We have marvelous books on reducing, rheumatism, cancer, nervousness, alcoholism, sinus, heart ailments, married love, feminine hygiene, divorce, child care, psychology, etc! Write today for free list! Daniel S. Mead Company, 200 (PS) West 20th Street, N.Y.C. 11.

ADULT Photographs! Daring! Six — $2.00. Satisfaction or refund! Box 699-M, Westfield, New Jersey.

1947 WHOLESALE catalog and Directory 10c. Latshaw Sales, Sunnyside-C, Indianapolis 44, Indiana.

ADULT Book. Revealing Sex Truths. "Illustrated." 50c. Kogan, 1032-SF, N.Y. 8.

ADULT Books. Catalog and Sample, 10c. Baker Service, Box 1840, Cleveland 6, Ohio.

ARTIST'S Pin-ups. Gorgeous models in tantalizing, breath-taking poses. Set 35 pictures $1.00. Baker Service, Box 1840 Cleveland 6, Ohio.

BACK issue magazines. Prices catalogue for $1.00. Credited on first order. Kovach, 712 So. Hoover, Los Angeles 5, Calif.

SOUTH AMERICA offers thousands of opportunities to the ambitious man with little cash to invest. Also to the man who has a trade or profession, regardless of what he does. You are interested in learning more about the big money regions of South America. Why not let the men help you who have searched this continent in the mighty Amazon River as well as in many cities talking with men in high positions with many years experience. These men in position to give reliable information are ready to serve you. $100,000,000 Programs are now being planned. Such as these will make opportunities equal our forefathers when empires were built in America. We will try to give you a picture as near as possible like you yourself making the research through this fascinating country. This report has cost thousands of dollars, took many months and many thousand miles of travels to be completed. The latest 1947 report is now ready. Be first to read it. Put to work your knowledge. Report No. 1. $5.00. Send Air Mail Now. South American Information Bureau, Dept. 2, Avenida Cuba 415, Lima, Peru, South America.

Copyrighted material

FREE bargain catalogue for adult book buyers. Kissin, Box 134, Madison Sq. Sta., New York City.

81 MAGIC TRICKS, PUZZLES, ETC.

FREE catalog magic, puzzles, tricks. Scheetz's, 981 Branch, Sellersville, Penn.

MAGICIANS', Gamblers' secrets exposed. Cards, Dice, Punchboards, Slot Machine. Catalog 10c. Book Co., Box 671, St. Louis 1, Mo.

"MAGIC Vanishing Card". Throw it into air, it completely disappears, reproduce it later from spectators pocket. Easy to do. Complete 25c with magic catalog. The Magician, 2463-D, Kensington Ave., Philadelphia, 25, Pa.

WORLD'S largest professional magic shop, keeps you in touch with latest tricks. To receive mailings, send 35c for new catalog. Holden's, 220-P West 42nd St., N. Y.

500 TRICKS! New 1946-7 edition Douglas famous Catalog. Now ready, only 10c. Brand new magic for pocket, parlor, club, stage, professional, amateur. America's fastest service to magicians everywhere for over 25 years. Send 10c Today. Douglas Magicland, Dept. 2, Dallas, Texas.

THE True Secret of Ventriloquism. Free booklet. Quackenbuch, Big Flats, N. Y.

FREE! Large Catalog of magical apparatus if you remit 25c for "MAGIC IS FUN" magazine. Robbins Co., 152-F West 42nd Street, New York.

200 ELECTRIC Stunts, 110 volts, $1. Cutting Sons, Campbell 3, Calif.

HYPNOTISM! 25 Lesson Course, $1.00. Monarch. 38-S Jefferson, Auburn, New York.

MAGICIANS pin, ghost illusion, Houdini escapes, giant catalogue. Everything, complete 25c. Magic Wands, 9w Colorado, Pasadena, Calif.

"SEND quarter for catalog and trick. Sparton Co., Hamilton, Montana."

BEWILDERING Hindu Mystic Trick, Catalogue 10c! Postways, Box 5325-X, Philadelphia 42.

READ the Fakir Monthly Magazine for Magicians. Copy 25c. Subscriptions $2.00 yearly. Rachun, 114 Grand, Brooklyn 11, N.Y.

"VENTRILLO" Professional Voice-Throwing Instrument and Catalog 25c. Box 971-PS. Philadelphia.

DOLLAR Magic Set Free with Mammoth Catalog 25c. Mysto, 4462-S Germantown, Philadelphia.

ITCHING, Sneezing Powders, Eighteen other Tricks, Free with Catalog 25c. Manufacturers, 2404N15, Philadelphia.

BE a Magician. Large professional magic catalog of latest tricks, 25c. Ireland, F-109 North Dearborn, Chicago.

TWELVE "Catchy" Tricks; Ten Side-Show Tricks; Magic Catalog. 10c. Lee's, 2231-S McKinley, Berkeley 3, Calif.

VANISHING Quarter trick and catalog 25c. Sterling Magic Co., Royal Oak, Mich.

JOIN Trick Of The Month Club. Mystify friends throughout the year. 12 months membership only $1.00. Trick Of The Month Club, Box 710, Roseville, Calif.

VENTRILOQUISM Taught. 3c stamp brings particulars. Smith, Dept. 410, 801 Bigelow, Peoria 5, Ill.

WALK away from your own shadow, defy the laws of Nature. At Homes, Nightclubs, or Stage! Amazing Magician's Secret only $1.00. H. Fowler, Box 1284, Boston 4, Mass.

63 GAMES, ENTERTAINMENT

BIC-KEEN—the atom bomb game, naval strategy—Brand new, $2.00. Bic-Keen, 1456 Penobscot Bldg., Detroit 26, Mich.

PLAY The Races At Home! Amazing phonograph record brings every thrill of the track right into your home! A different winner every time—impossible to predict in advance! Complete with tote board, listings, only $1.69. Rush your order now! Novelty Records, 412 S. Market Street, Dept. A-272, Chicago 7, Illinois.

HOME Model Slot Machines and Coin Operated Games. Write for catalog. Webb Distributing Co., Dept. P4, 6 South Kedzie Ave., Chicago 12, Ill.

PHONOGRAPH Records Cheap. Catalogue. Paramount, SD-313 East Market, Wilkes-Barre, Penna.

36 COIN COLLECTING

FREE! Foreign coin, banknote and Coin Collectors' Illustrated Catalog to approval service applicants. Send 3c postage. Tatham Coin Co., Springfield-D50, Mass.

FOREIGN Coins on Approval on Request. Del Monte, 40 W. 18, N. Y. 11.

WORLD Coins 25 different $1.00. Harry Elsholz, Box 9014, Pittsburgh 24, Penna.

LARGE cents—Indian Heads. Reasonable. Free lists. Hutchinson, 3463 "I" Street, Philadelphia 34, Pa.

UNUSUAL Worldwide collection twelve different foreign coins and bills only 25c. Webb, Box 473, San Bruno, California.

FOR Sale: 50 assorted Indian Head pennies, $1.25; 1893 Columbian World's Fair half dollar, 75c; Large U. S. Catalog, 25c; Giant Foreign catalog listing copper, silver, gold, 50c. Ben's Coin Shop, 72 West Washington, Chicago 2, Illinois.

$2.00 TO $200 each paid for hundreds of Old or Odd Coins. Indian-Lincoln-Foreign Wanted. Keep all until posted. Send 20 Cents for illustrated Coin Value Book. 4 x 6. Guaranteed Prices. 40 years in business. Coin Exchange (1), Le Roy, N. Y.

20 DIFFERENT Indian Head cents, $1.00. Price list 5c. E. Walton, 7 Water, Boston 9, Mass.

WILL Pay $10.00 each for certain Lincoln Pennies! Indianheads $50.00; Dimes $1,000.00. Catalogue 10c. Federal Coin Exchange, 6-PS, Columbus, Ohio.

COMMEMORATIVE $½ — Columbus, Washington, Cleveland, Stone Mountain, $1.50 en. Illustrated Catalogue 25c. Norman Schultz, Salt Lake 9, Utah.

5,000 BARGAINS. 400 Antique Firearms; 2,000 Coins; 10,000 Indian Relics; 10,000 Rocks—Minerals—Fossils; 10,000 Collectors Cartridges. Illustrated catalog 25c—Heike, Wenona 14, Illinois.

96 OLD STAMPS WANTED

WHAT have you to offer? A collection? A "Shoe Box" accumulation? Anything in stamps. We urgently need them. Spot cash paid. Cosmopolitan Stamp Co., 1457 Broadway (Times Square), New York.

127 STAMP COLLECTING

EGYPT—15 different, 5c to approval applicants. Bohemia Stamp Service-2, Bohemia, N. Y.

WORLD'S Largest Diamond And Triangle Stamps, Free Stamp Magazine. Stamps from Fighting Free French, 20 stamps from 20 different Countries, Pictorials, Airmails. Big Bargain 5c with approvals. Capital Stamps, Dept. 10, Little Rock, Ark.

BRITISH Empire! 55 Different including Batum, Burma, Cyprus, Gwalior, Tasmania. 5c to Approval Buyers. Lyman, 97 Nassau St., New York 7.

FREE—Canadian Sets Royal Visit, George VI, George V, Coronation, Jubilee, others, to approval applicants. Ensign, Box 118-P, So. Orange, N. J.

DEALER'S Wholesale Catalog. Postage 3c. Franksco, 5031 Queensbury, Baltimore, Maryland.

WOW! $10.00 Worth Of Fun Only 10c. What a treasure hunt! Big package 500 Foreign Stamps—just as received from foreign missions other sources. Includes stamps from Africa, South America, Philippines, Free French, Cape Juby, Palestine, etc., including airmails, commemoratives, and stamps worth up to 50c and 75c. This amazing offer is given for 10c to serious approval applicants only. One to a customer, money back if not more than delighted. Jamestown Stamp Co., Dept. 5, Jamestown, New York.

50 DIFFERENT including scarce diamond-shaped airmail 3c to approval service applicants. Avalon Stamp Co., Dept. S, Springfield 8, Mass.

BRITISH, Spanish and French Colonies, Vatican, Hitler heads, and airmail packet, free with approvals. Pan-American Stampco, Box 145, New York 33, N. Y.

$2000 IN Stamps free to Contest Winners. Particulars, entry blank, to approval applicants enclosing only 10c for scarce Roosevelt Mourning Stamps from Nicaragua, Greece & Argentina, plus photograph of "Roosevelt Collecting Stamps." National Stamp Sales, 276 R, West 43rd St., New York 18, N. Y.

ROUND The World Colonies, British, Dutch, French, Portuguese, strange little known countries, primities, cannibals, etc. All for 3c to Approval Buyers. Dixie Stamp Company, Dept. 11, Milwaukee 1, Wisc.

118 Different Stamps including Commemoratives, Charities, Airmail, surcharges, Sets etc. Only 3c to approval buyers. Badger Stamp Stamp Company, Dept. S, Milwaukee 3, Wisc.

TREMENDOUSLY Popular, virtually certain to rise to value, is Nicaragua's Roosevelt Memorial Issue, picturing Roosevelt Collecting Stamps, Conferring with Churchill at Atlantic Conference, and Signing Declaration of War against Japan. Three handsome genuine unused stamps (Nos. 695-7) that every collector wants! Special price, with attractive approval selection, only 10c! Garcelon Stamp Company, Box 818, Calais, Maine.

FREE. Irish Commemorative Collection, Including Dramatic Easter Rebellion Issue With Approvals. Raymax, 123-X William St., N. Y. C.

FINE Approvals, freshly mounted. Fast, personal service. Tell me what countries you prefer and I'll send their stamps. Milton Skinner, 438 Locust, Long Beach 2, Calif.

UNITED STATES Price list. Send Postage. State Stamp Corp., 1225 Park Bldg., Pittsburgh 22, Penna.

UNITED STATES approvals complete coverage fine quality, attractive prices. Seminole Stamps, Box 378, Coconut Grove, Florida.

FREE U. S. Price list postage 3c. M. Hanna, 335 5th Ave., Pittsburgh 22, Pa.

FREE! Negro Triangle; Turks Islands "Cactus"; Dakar; Guinea; Palestine; "Fairy Tale", Pirate Chart, Map, Ship, Sea Lion and Snake stamps; French, British, Portuguese Colonies, etc., Free for 3c postage. Approvals. Potomac Stampco, Washington 10, D. C.

FREE—Abyssinia, Cayman Islands, Tuna Triangle, Indochina, Syria, Ivoire, Philippines (Jap "Shame" issue), Turkish Harem, Damascus, Cambodia, African "Beauty," Pirate Islands, Colonials, others —All Free for 3c postage with approvals. Belmont Stampco, Washington 10, D. C.

FREE—Famous Americans Set, plus Flag Set, plus the National Parks set, plus the Presidential Set to the $5. A total of 90 stamps absolutely Free to customers for our unsurpassed United States or Foreign selections. Send 3c postage for 15 of the above mentioned stamps and full particulars. Triboro Stamp Company, 145 Nassau Street, Dept. 203, New York.

200 DIFFERENT stamps, 6c, to approval service applicants. Tatham Stamp Company, Springfield 50, Mass.

"MINT French Coat-of-Arms, Vatican, Hitler Heads, Airmails. Free with approvals. Gulfstream, Drawer 71, Miami, Fla."

U. S. 797 SPA Sheet only 5c to applicants for U. S. approvals. M. Haycock, 61 O'Brien Pl., Brooklyn, N. Y.

PENNY Approvals that satisfy. Neil Gronberg, Box 5441S, Philadelphia 43, Pa.

50 DIFFERENT United States 10c. Price list free. No approvals. Seidenberg, Cassopolis, Mich.

UNITED States and Foreign stamps sent on approval; outstanding quality, low prices. Fred Herzberg, PS 168 Oak St., Elmhurst, Ill.

OLD scarce U.S. Seconds on approval. Slightly defective, nice appearance, bargain prices. Hearnfeld, 551 Clinton, Newark 8, N. J.

FIVE Vatican City Stamps Free to approval applicants. Florida Stamp Co., Box 807, Miami 5, Fla.

Copyrighted material

1,000 GRABBAGS, 15c each. Special Bags 25c. Sandy, 630 Bingaman, Reading, Pennsylvania.

FREE Vatican Cardinal set five values to approval applicants. Wesken Stamp Company, Box 66P, Queens Village, N. Y.

SCARCE U.S. Stamps Nearly 100 Years Old. 1893 Commemorative. $5-$10 stamps. Armed Services Pictorials complete. Roosevelt set. large Allegorical Figure of Commerce. Old Revenues. everything 5c to serious approval applicants. Metropolitan. 140 Nassau. New York 7.

VATICAN City! Four varieties of Vatican City (world's smallest country) including portrait of Pope Pius! Also stamps from Afghanistan. Cape Juby. Libya. Macao. Palestine. Syria. Liechtenstein. San Marino. and many other interesting countries. All together 48 different stamps. total catalog price over $2.50!—only 10c to approval applicants! Methuen Stamp Service. Inc., Dept. 210. Methuen. Mass.

FREE—New souvenir sheet commemorating 100th Anniversary of our country's stamps—Free to Applicants for our outstanding United States and Foreign Approvals. Send 25c which you will deduct from your purchase. S. D. Engel. 38 Park Row. New York.

OLTRE Giuba! Complete Set of Map Stamps from this Strange Country. Catalog value $1. Only 10c to approval applicants. Star Stamps. Lakewood. New York.

AMERICA's Friendliest Stamp Magazine! Chock-full. information. news. bargain offers! Trial subscription. 25c! "Stamp Post". Station A. Pasadena. Calif.

FREE 35 Stamps with approvals. Hohowski. 305 Phila. Block. Cannonsburg. Penna.

FREE — Liberia Triangle. set Hitler Stamps. Half-Stamp Triangle. Devils Island. others. Approvals. Postage 3c. Pilgrim. 6404 Old Harford. Baltimore 14. Md.

31 DIFFERENT with George Washington Stamps. from Brazil and Ecuador; Pirate Island; Victory issue; Medical set; others—all 4c with approvals. Grayson Stamps. Sherman. Texas.

POSITIVELY Greatest free offer—Latest Scott's International $6.00 stamp album —covering entire world. contains 36,000 illustrated descriptive spaces; Scott's 1947 Standard $6.00 catalogues "Philately's Encyclopedia"—absolutely free to applicants for foreign approvals becoming customers. Bargain Stamp Service. Santa Ana. California.

GIBRALTAR Packet Free—Nice collection Gibraltar—New Zealand Centennial—British Uganda—French Colonials—Early British Colonial — West Indies — South American—War stamps plus Philatopic Monthly Magazine. All for 5c postage. Empire Stamp Co.. Dept. P R. Toronto 5. Can.

VALUABLE Catalogs 10c Each: (1) "United States & British N. America" complete with 1.000 illustrations; (2) "Airmail Stamps"; (3) "British Empire"; (4) "Modern Europe"; (5) "Annual Catalog" of albums. supplies. packets. advice to beginners. etc. Each catalog 128 or more pages. profusely illustrated. wonderfully informative! Harris & Co., 204 Transit Bldg.. Boston 17. Mass.

PROTECT and Beautify your stamps. blocks. covers. etc. with Crystalmount. Write for free samples. Harris & Co., 204 Transit Bldg.. Boston 17. Mass.

COOK Island: mixed $1.00. No approvals. Krueger. Tirohia. Paeroa. New Zealand.

PENNY Postcard brings you greatest free offer—with approvals. C. S. Woolbert. 904 W. Main St.. Millville. N. J.

SAN MARINO—16 values mint (4 sets) —Commemoratives and airmails. All for only 15c to approval applicants. Thiem. Cape Vincent. New York.

50 DIFFERENT stamps free approvals. Decon Stamps. 105 North Main St.. Pearl River. N. Y.

MINT France price list sent for postage. Harold Penny. Rowayton. Conn.

UNITED STATES $4.00. $5.00. $10.00 Stamps and U. S. packet only 3c to approval buyers. Wineholt Stamp Co., Woodbine 4. Penna.

20,000 DIFFERENT 1c-5c each! Gordon Davison, Box 1019A. Manchester, N. H.

CHINA 20 Colorful Historical Stamps 10c with approvals. Collins'. 71 Coleridge. San Francisco 10, Calif.

25 DIFFERENT Stamps 10c. Tunis And Carpenter, Wakeman Ave., Newark 4, N. J.

GENUINE "Goya Nude" set 10c to approval applicants. Royal Stamp Company. Tamaqua 2. Penna.

UNITED STATES Collection-Thirty-seven fine unused commemoratives before 1943 including Columbians. Bicentennials. Parks. Price $1.03 approval applicants only. Orange Stamp Co.. Albany 3. N. Y.

UNITED STATES Approvals—Largest varieties. Americas lowest selling prices. Stamp Company. Albany 3. N. Y.

43 U. S. mint from Famous Americans. Parks. etc. Perfect condition. $1.00. Superb. 1214 Wheeler Ave.. Bronx. N. Y.

FREE! 20 Mint recent Hungary to approval applicants. Quality Stamp Company. Box 202. Sta. F. Buffalo. N. Y.

EXOTIC Pictorial collection: Tahiti spearfishing. Melanesian idol. Ingavi battle. Reunion. Madagascar. St. Pierre Miquelon. Djibouti. Wurttemberg. Dutch Indies. Newfoundland. many others. This outstanding offer only 5c. Imperial. Box 1491. Tampa. Florida.

10 DIFFERENT U. S. Over 40 Years Old. 5c. Foreign. U. S. approvals. Scott. 22 Middle St.. Lexington 73. Mass.

WORLDWIDE Different: 200-25c; 500-60c; 1000-$1.50. Beacon Sales. Maynard 3. Mass.

BERLIN Bears Complete set of eight and 100 different stamps only 10c to approval applicants. Reich Stamp Co.. 4647 Kenmore. Chicago 40. Ill.

GALA-group free! U. S. commemoratives. Cameroons. French Equatorial Africa. Madagascar. New Caledonia. Oceania. St. Pierre and Miquelon. with approvals. Hill Stamps. Box 732. Woodmere. N. Y.

TEN Beautiful mints free with Grade A approvals. fast service. Cornell. Box 4259C. Miami 26. Fla.

GENUINE magnifying glass. plastic handle—only 10c! To approval applicants. Elliot. Box 51. Miami Beach 39. Florida.

300 COMMEMORATIVES. Pictorials. etc.. plus surprise packet $1.00. Schneider. Box 1012. Chicago 90.

ZOWIE-E-E! A Barrel of Fun for only a Dime! 500 United States Stamps—Absolutely unpicked and unsorted. just as received from church missions. Many varieties. including large commemoratives. airmails. high denominations up to $5.00! Stampdon's biggest package of fun. and you might find something really valuable!! Price only 10c to serious approval service applicants. Money back if not delighted. Illustrated bargain lists with each order. Mystic Stamp Co.. Dept. 55. Camden. New York.

30 BEAUTIFUL Airmails 10c. Selected Approvals. Louis Morrison. Milmont Park 2. Pa.

UNITED STATES. Used #182. #184. #206. #248. Mint #486. #487. #529A. #582. #583. Only 50c. Approvals accompany. Whiton-Stamps. Westport 1. Conn.

ROOSEVELT Memorial Collection. 21 historic stamps. from ten different countries. honoring FDR $2. Fred Coops. Box 215. Fontana. California.

NUDE Duchess set (two values) 5c to approval applicants. Mastars Clifton. Kernan. Baltimore 7. Maryland.

FREE. Send this ad. get ten different World-Wide stamps also free coupon for other free stamps. Stampdean. Box 202. Wilmette. Ill.

PICTORIAL Packet! Philippines. Panama. Palestine. Paraguay. Portugal. Porto Rico. Poland. Peru. Persia. Free to Approval Applicants. Eliot Stamps. 86-31 Eliot Avenue. Rego Park. N. Y.

25 DIFFERENT Switzerland 10c with ¼-½-1c Approvals. Carroll's. 4357-C S. Hoover. Los Angeles 37. Calif.

MISSION Mixture 500 stamps 25c. Garrow. 84 Montevista. Chula Vista. Calif.

WHOOPIE! Wowie! 25c worth of U. S. stamps free! No obligations! Write: M & N Co., 742 Sheffield Ave., Brooklyn 7, N. Y.

SMOKY Mountain Commemorative Souvenir sheet and 30 different U. S. stamps. including commemoratives. Airmail. etc. (catalog value exceeds 65c) for 10c to approval applicants. Curhan Stamp Co.. Dept. 1. Gloucester. Mass.

YOUR Money's Worth! Seychelles. Djiboute. Angola. Chinese Hunger Stamps and over 100 different other stamps. Everything 10c to approval applicants. Atlas Stamps. 4220 West 16th.. Dept. M. Little Rock. Ark.

1933 VATICAN set. 25c with approvals. Vargo Stamps. 6044 South Fairfield. Chicago 29. Ill.

PROGRESSIVE United States approvals. Adults only. Panther Stamps. Dorchester 24. Mass.

3-LEGGED Buffalo Nickel $1.25. 20 Different Indian Cents $1.00. Whitman Folders 25c. Whitman Retail Guide Book $1.50. Handbook 50c. Minimum Order $1.00. Fast Service. Retail Catalogue 10c. Bebee Coin Company. 1180 East 63rd. Chicago 37. Ill.

APPROVALS — No prizes — Just Good Stamps. W. P. Stamp Co., 80-04 193rd Street. Jamaica 3. N. Y.

POPULAR Approvals at ½c up. Small Stampdealers. 2616 Cortez St.. Chicago 22.

GRAND Value Packet. containing five foreign sets. Free with approvals. Stoll Stamp Service. 2632 West Burnett. Louisville 10. Kentucky.

ICELAND Packet free to approval applicants. Write now to Everglades. Box 3222. Station F. Atlanta. Georgia.

$10.00 FOR $1.00. Box full stamps valued Scott's $10.00 and Stamp Album. Everything $1.00. Longacre Shop. 100J West 42nd. N. Y. City 18.

MIDGET set world's smallest stamps included in June offer to new approval applicants. Also stamp showing Hitler and Mussolini. triangle. everything for only 3c. Detroit Stamp. 10304 Dexter. Detroit 6. Mich.

"ROOSEVELT. Churchill. Stalin. Hitler. Vatican City stamps free. to approval applicants. Flamingo Stamps. Box 517. Miami Beach. Florida."

UNITED STATES approvals. Fine quality. low priced. N. E. Whitlow. 302-E South Barnett. Dallas 11. Texas.

SIXTEEN Hitler Stamps for 15c. Foreign. United States Approvals Accompany. Yokum's. 308 Moore Building. San Antonio 6. Texas.

FREE packet; unusual approvals. Stamp Box. 2439 South Fifth. Philadelphia 48.

FREE 25 Different Canada; Approvals. Knight Stamps. Box 3770. Portland 8. Ore.

GIANT Roosevelt free with approvals. Granada. 4891 S. W. 5 St.. Miami 34. Fla.

50 DIFFERENT China. 5c; with approvals. Gross Stamp Company. 1768 Stuart St.. Brooklyn 29. N. Y.

U.S. $5. Stamp given free. Approvals sent Bala Stamps. Bala Cynwyd. Pa.

70 HOBBIES, COLLECTIONS

JEWELRY stones removed from rings. etc.. 100 assorted $2.40; 50 large ones $2.40. B. Lowe. Holland Building. St. Louis 1. Mo.

INVENTING can be an interesting and profitable hobby. Write for complete particulars. Institute of American Inventors. Dept. 30-E. 2926-Eye St.. N. W.. Washington 6. D. C.

UNUSED Match Book Covers. 100 all different $1.00. 35 Royal Flash Covers $1.00. Free catalog. Charles Edelman. 1311 P East 84. Cleveland 3. Ohio.

KLONDIKE! For Hobby Jewelry Makers! Novelty Jewelry Findings swept from tables of large manufacturers—parts for Bracelets — Pins — Earrings. etc. — unfinished. Chains — Rings — Pins—Stones — Clips—Beads—many other items—1 Lb. Bags—$2.00 Per Bag in 5 Bag Lots. Sample Bag—$3.00. Prepaid Only. Mdse. Distributing Co.. 19 E. 16th St.. New York 13. Dept. P.S.

CAMPAIGN Ribbons—Beginner's Package—Introductory Price—50c. contains 15 Assorted Ribbons. L.H.G. Company. 19 E. 16th St.. N. Y. 3.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

INTRODUCTORY Offers:—10 Officers Insignias 25c; 22 different American or 15 different foreign—$1.00. 10 different Metal Collar Insignias our choice—$1.00. Illustrated catalog 10c. Hobbyguild, 35X, West 32nd St., New York.

EXCHANGE Your duplicate stamps, match covers, or any hobby, with collectors everywhere! Directory listing swappers, 10c. (Mention hobby). World Hobby House, Box 721-B, Olympia, Wash.

MILITARY Insignia. Metal Regimental Crests 1001 items.—Send 25c for Sample Crest. Catalog. Bon-Lee Co., 5801 15th Avenue, Brooklyn 19, N. Y.

INTERESTED in Hobbies? A wealth of information about Accepted—Unusual—Profitable Hobbies in every issue. Sample copy with valuable coupon 10c. Collector-Hobbyist, Box 864-D, Denver, Colo.

8 ANTIQUES, RELICS, INDIAN GOODS

ANTIQUE-modern pistols, revolvers, swords, daggers, armor. 174-page illustrated catalog 50c. Robert Abels, 860½ Lexington Avenue, New York 21.

4 FINE ancient arrowheads $1.00. Stone Tomahawk $1.00. List free. Lear's, Box 569, Galveston, Texas.

SEND 25c for Illustrated Bargain Hobby Catalog—Heike, Wenona 16, Illinois.

85 MINERALS & PRECIOUS STONES

FIFTY mineral specimens, boxed, mounted, identified, described. Postpaid $4.00. Old Prospector, A-85, Dutch Flat, Calif.

"GENUINE" French Rhinestones Packet Assortment 50c. Herber, 1360 Hicks, N.Y.C. 67.

JEWELRY stones removed from rings, etc. 100 assorted $2.40. 50 large ones $2.40. B. Lowe, P.S. 50, Holland Building, St. Louis 1, Mo.

GEMS, precious and semi-precious, all genuine from world wide sources. Deal direct, no overhead, save money. Catalog 10c. Hill Co., Route 7-K, Salem, Oregon.

MINERALS—Gems, Cutting, specimen. Low prices. Free list. Plummer's, 5068 Brighton, San Diego 7, Calif.

26 CAMERAS, PHOTO SUPPLIES

CASH! Spot cash for cameras, lenses, binoculars, movie and still equipment. Send full description for prompt cash offer. Over 36 years of dependability. Bass Camera Co., Dept SP, 179 W. Madison St., Chicago 2.

USED Camera Directory, Box 1031-K, Canton, Ohio—lists hundreds of War-Bargain Used Cameras—35mm, Speed Graphics, Kodaks, Rolleiflex—many others. Send 25c for latest issue.

BASS Says: Trade Cameras? For 36 years Finest equipment available. Always Satisfaction Guaranteed Or Your Money Back! Bass buy 'em, trades 'em. Bass Camera Co., Dept. SP, 179 W. Madison St., Chicago 2.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1741, Chicago 5.

MOVIE Film 8-16mm.—tremendous savings! Eastman Kodak Super X, Weston 32. From Government stock. Tested—unconditionally guaranteed! 16mm.—100 ft. roll, $1.95; 50 ft., 98c; 50 ft. magazine, $1.35. 8mm.—25 ft. double-8, 75c. Processing: 50 ft., 75c; 100 ft., $1.00; 8mm. 25 ft., 75c. Finest quality—fast service! Photo Surplus Sales, Dept. PS 5, 12 Duane Street, N.Y.C.

BENSEN Light. Fits on all movie and still cameras. Uses reflector fotofloods. Eliminates clamplights. At dealers or send money order $9.45 (Includes tax. Less Bulbs). Free booklet. A. L. Bensen Co., Staten Island 2, New York.

CAMERA'S-Enlarger's — Movie Film — Big Free Catalog. Cavalier Camera, 1822 Center, Pittsburgh 19, Penna.

PHOTOGRAPHIC equipment. Representatives wanted. Atlas, 1619 Glendale Blvd., Los Angeles 26, California.

BEAUTIFUL Alaska. Will expose your 35mm Kodachrome. Airmail film and $2.20 Exp $3.36 Exp. Dan Larson, Homer, Alaska.

SPEED-O-COPY Groundglass focusing attachment for Leica, Contax Argus C-2 and C-3. Send for Literature. D. Paul Shull, 240 S. Union, Dept. P.S.-6, Los Angeles, California.

"INEXPENSIVE coversion for ground glass cameras, see what you take. Send $1.00 for detailed instructions. Safety Educational Service, 449 Spaulding Ave., Newcomerstown, Ohio."

102 PHOTO FINISHING

FREE! 5x7 enlargement! Rolls developed and eight lifetime doublesize Velox prints made by modern electronic equipment only 30c. Reprints from negatives, same size 3c; doublesize 4c. Candid rolls, finegrain developed, 3x4 prints. 12 exposures 45c; 16 or 18 exposures 65c; 36 exposures $1.25. Return ad with roll and receive absolutely free 5x7 enlargement. Franklin Finishing, Box PS7, Framingham, Massachusetts.

NEW Color Process makes full color prints from black and white film or negatives. Send dime for Sample. We have Films. Midwest Photo, Janesville 27, Wis.

BIGGEST $1.00 value in 35 MM finishing today. 36 exposure fine grain 3¼x4½ enlargements; deckled, embossed margin and date. Eighteen exposures 75c; 16 exposure splits 55c; 36 exposure reloads 50c. Special: return this ad with $2.00 and we will send five 36 exposure reloads. Free mailers. 8 exposure rolls in beautiful, Deckled contact finish with embossed wide margin, 25c. Mailbag Film Service, Box 5440-A, Chicago 80.

PHOTOGRAPHY for pleasure or profit. Learn at home. Practical basic training. Long established school. Write for booklet. American School of Photography, 1315 Michigan, Dept. 1722, Chicago 5.

LARGA-PIC—We have only one offer, but it's an outstanding one! Your roll developed and 8 prints made into brilliant Larga-Pic photos for 30c. Reprints from your negatives 4c each. Write for Free mailers. Larga-Pic, Box Z-4, Brookline 46, Mass.

ROLL Developed and 8 prints 25c or 8 enlargements 30c. Reprints 3c. Enlargements 4c. Young Photo Service, 406-C, Albany 2, N. Y.

ABSOLUTELY Free! Four Unusual Photographs! Artcraft, 1600 Coney-Island, Brooklyn 30, N. Y.

THREE prints each 8 exposure roll 40c. Two each 35c. One each 25c. Reprints 3c. Fred A. Eastman, Bode, Iowa.

CENTURY delivers work and service that can't be beat. Sixteen Famous Century-Tone prints each 8-exp. roll 30c. Free Mailers. Century Photo Service, La-Crosse, Wis.

ROLLS Dev & Printed Giant size 30c. Reprints 3c. Thrifty, Box 688, Sta. H., Los Angeles, Calif.

ENLARGEMENTS matte or glossy 5 x 7 $.40. 8 x 10 $.50. Enlargopics, Box 161, Knickerbocker Station, New York 2, N. Y.

ENLARGEMENTS—5 x 7—10c; 8 x 10—25c. From your negatives. National Film Service, 3111 West Tuscarawas, Canton 3.

8 BEAUTIFUL Double Size pictures and roll developed 30c. 8 hour service. Free Mailers. Pacific Photo Service, Box 666, San Francisco, Calif.

ROLL developed and 8 prints 30c. Overnight Service. Free Mailers. Tri-Plex Photo Service, Box 375, San Francisco, Calif.

SPECIAL—50 reprints $1., Suburban Studio, 1410-S Bond, Rockford, Illinois.

PRINTS Enlarged 3¼ x 4½, 35mm (36 Exposures) $1.00. 18 Exp. 60c. 16 Exp. Split 50c. 8 Exp. 30c. Reprints 3½c. Holly Finishers, Box 625E, Succasunna, N. J.

90 MOTION PICTURES, SOUND EQUIPMENT

UNUSUAL home movies: Travel, adventure, sports, comedies, Silent-Sound. Many film bargains. Big illustrated 1947 catalog, sample-dime. Audet, Box 6520-AG, Philadelphia 38, Pa.

16mm MOTOR Driven Projectors—$16.00—Up. Selco Products, Denvers, Mass.

GUARANTEED Fresh anti-halo outdoor movie film! Weston 12 Daylight loading! Processing free! Three spools Double 8mm, $3.45! Six single 8mm for Univex, $4.60! Postpaid! Catalog. ESO-S, 828-A, West 39th, Kansas City 2, Missouri.

8-16mm SILENT-sound films. Complete rental library. All latest subjects. Free catalogue, (sample film 10c). Garden Film, 317 W. 50th, N. Y. 19.

EXCITING Film. For artistically presented subject, "Exciting Stars in Action", starring glamorous girls, send only $1. State 8-16mm. Exciting Films, 1071 El Centro, Dept. E, Hollywood, Cal.

LEARN movie projection, management. Free catalog. Theatre School, Elmira, N.Y.

"MISS America, 1946". Projection length test film. $1.00. Complete editions, 8mm. 50 ft. Kodachrome, $7.50. black-white. $2.00. 16mm. 100 ft. Kodachrome, $14.75. black-white, $4.00. 43 subject color catalog. 25c. World In Color, Box 392-A, Elmira, N. Y.

16-35mm Silent, Sound films, projectors. Bedner, 5300 So. Talman, Chicago.

SELECTED Films, Photos, Slides. List 10c. Thomas Productions, 2709 West Ave. 34, Los Angeles 41, California.

IMMEDIATE delivery of 16mm Sound projectors. Large stock of Castle, Official, Nu-Art and Pictorial films. Soundies, Comedies. 16mm Anscocolor film. Used 8mm. 16mm Sound. List Titlers, Splicers, Editors, Rewinders. (Home Movies, 41 South Fourth Street, Allentown, Penna.)

BEAUTIFUL Kodachrome Slide and Lists 25c. Slide Supply Service, 3111 West Tuscarawas, Canton, Ohio.

FILM—Free processing 100 ft. 16mm Weston 12 $3.25, Weston 24 $4.90, Weston 64 $4.95. 25 ft. double 8mm Weston 12 $1.50. Weston 24 $1.89. Weston 64 $1.99. We have new Revere Cameras and Projectors. Will take your old machine in trade. Free circulars. Fromader Genera, Davenport 5, Iowa.

UNUSUAL movie."Temptation"featuring beautiful models. 100 ft. 16mm $5. 50 ft. 8mm $3. COD's accepted. Catalog free. Fine Arts, Box 2084, San Antonio 5, Tex.

USED Victor Sound projectors $175.00. $350.00. Send stamp for 8mm, 16mm lists. Sterling's, 679 Northampton, Easton, Pa.

CHILD Is Born By Caesarean Delivery. The outstanding home movie production. Project it free. Send postal card immediately. Preferred Movies, Hamilton 31, O.

TALKIES: Convert your silent 16mm projector into sound with our guaranteed parts kit. Plays all 16mm sound films. Quickly assembled at home. Special introductory offer. Send this ad now with $25.00, check or money order, and we will include sound test film, instruction manual and full information on how to use with your radio. Kit includes photocell, exciter lamp, optic, which makes a sound head complete. Or send $1.50 for complete blue prints showing how to make adapter yourself. Apex Video, Box 3071S, Hollywood 28, California.

DEVELOPING units for movie film with Instructions. Literature. Duro Movie Products, 1519 Eggert, Eggertsville 21, N.Y.

JOIN World's largest Movie Society. Many advantages. Details Free. International Cinematographers, 6770 Hollywood Blvd., Suite 218, Hollywood 28, Calif.

ART model films 16mm rentals exclusively, adults list. Enclose stamp. Revere Films, Box 1051, Detroit 31, Mich.

"THE World's Greatest Passion Play". All sizes. Rent or Purchase. Write Hemenway Film, 33 Z Melrose St., Boston 16, Mass.

FREE. Movie Catalog; sample film 10c. Cameras, Projectors. Goodwill Company, Jackson, Tennessee.

PROJECTION Screen 38x38 with container only $4.00. Curiophoto, 1187 Jerome Ave., New York 52.

MOVIE Camera Films 100' 16mm $2.25 three rolls $6.00. 100' high speed $2.75. 25' double eight $1.25. Ambassador, 479-A Quincy Street, Brooklyn 21, New York.

Copyrighted material

92 MUSIC, MUSICAL INSTRUMENTS

PIANISTS Popular Music Chord Chart: shows names; symbols; readings; enharmonics; notations; 648 treble. 180 bass positions. Sensational! Desirable! Practicable! Only $1.00. Carol Music Chart Co., Box 21-PS, Lefferts, Brooklyn 25, N. Y.

"SONGWRITERS. Send Poem For Free Examination. Outstanding Offer. and Free Instructive Booklet. United Music. 108. Salem, Indiana"

INSTRUMENTS for less and still the best. Send for Bargain Catalog. Harden's Musical Merchandisers. Marion P., Ohio.

ATTENTION: Fine Harmonicas $2.00, $2.90. Double row $3.00. $5.00. $7.75. $9.75 — Chromatics $5.50 — Accordions — Drums—Guitars Sold Reasonably—Bugles $8.75—Instruments Repaired—Catalogs 25 cts.—Musician's Shop. 2 E. Centre Street —Baltimore 2. Md.

PHONOGRAPH Records Cheap. Catalogue. Paramount. SD-313 East Market, Wilkes-Barre. Penna.

LEARN Piano Tuning. Prepare for Career in fascinating profession. $5000 year easily earned. Real security. pleasant easy work. No profession Paying so well can be mastered so quickly. Natural Aptitude. desire to get ahead chief requirements. Prospectus and full information on request. Harmony School of Piano Tuning. Box 582. Harrisburg. Pa.

SAXOPHONE Conn Tenor Excellent Condition Private $175. Evergreen 8-9505. 646 Grand Street. Brooklyn.

122 SONG WRITERS

POEMS Wanted to be set to music. Free examination. Send poems. McNeil, Master of Music, 510-PS, S. Alexandria. Los Angeles. California.

SONGWRITERS. Songs Published Monthly. Advance Royalty. Send your songs or poems today for our exciting offer. Hollywood Tunesmiths, Dept. 10F-C, 1537 N. Vine, Hollywood 28, Calif.

POEMS Wanted For Musical Setting. Send poem for immediate consideration. Five Star Music Masters, 646 Beacon Bldg., Boston.

SONGWRITERS Outstanding Honest, Music writing offer. Dick Reynolds, Leonard. Texas.

"POEMS Wanted For Musical Setting! Send Poem For Free Examination. Outstanding Offer and Free Instructive Booklet. United Music. 107. Salem. Indiana"

SONGWRITERS: $100 Cash Awarded Each Month For Best Song or Song Poem. Melodies supplied Without Charge By Hollywood composers. Lead sheets and records furnished. Cinema Song Co., Dept. B-45. Beverly Hills. Calif.

"SONG Entries open for publication. No charge for publication. Mueller Music. 2907 Pennsylvania. St. Louis 18. Mo."

SONGWRITERS—Protect your songs. Get the facts first. Free booklet, attractive offer. Song Service, 331-J West 46th, N. Y.

SONG Writers. don't waste money! Get the facts first; write for free booklet. Songwriters Service (Dept. P.S.) 113 West 42nd St., New York City.

POEMS Wanted for musical setting. Send poem for immediate consideration and Free Rhyming Dictionary. Richard Bros., 46 Woods Bldg., Chicago.

POEMS Wanted for new songs. Send poem for Free examination. Eliot Wright, Master Composer, 206 Rivoli Theater Building, Portland, Oregon.

112 RADIOS, SUPPLIES & EQUIPMENT

RADIO-electronics books supplied by mail. Servicing, troubleshooting, home study, radio math, electricity, etc. Send postcard for free illustrated catalog. Nephews Publishing Company, 300 Pacific Street, Brooklyn 2, N. Y.

MAKE Simple, Tubeless, Batteryless, Distance-Getting Crystal Radios. Crystal and illustrated instructions 25c postpaid. Allen, 427-S, Clinton, Mo.

ONE Tube Radio Kits. Catalogue Free. Radio. Box 302. Clarendon. Texas.

RADIO Service men and experimenters send stamp for our giant radio catalogue. Save dollars. United Radio Co., (1000-V) Newark 1, N. J.

1947 REVISED "Plans 18 Crystal Sets" (SW record 5800 miles). Catalog. "Radiobuilder"—25c. 3 issues "Radiobuilder"—25c. Laboratories. Box Eye-T. San Carlos. California.

FREE New Radio Catalog Is Ready! Radionic's catalog lists radios. hard-to-get radio parts. books. amateur. test and P.A. Equipment. All available for immediate shipment. Send today to: Radionic Equipment Co., Dept. 156. 170 Nassau St., New York 7. N. Y.

BUILD "Loudest" Crystal Radio. Instructions and Crystal. 25c. Amoroses Radio. Route Four. Richmond. Virginia.

BUILD Radio, Phonograph, Combinations. Complete Kits. Catalog. Radion. 6922E. 21st Ave., Brooklyn 4. N. Y.

HEADPHONES Finest Type light weight two thousand ohms resistance. with headbands $2.95. without headbands $1.45. Can be used to make razor blade or crystal radio. Complete plans 25c. Send check or money order. Nico Supply. 1700 Walnut, Phila. 3. Penna.

LOUD Crystal radio. also one tube radio. new design. Illustrated plans for both 25c postpaid. Radio Leader. Box 391-B. Claremont. California.

BUILD a single tube. short-wave receiver. Operates on 20-40-80-160 meters. Complete kit—$8.95. One tube. five meter. army transmitter. wired and tested—$7.50. Free literature. Atkinson Radio Labs., Norwood. Penna.

BUILD one-tube cigarette case radio. Easy to build. Plans 50c. Complete kit less Batteries $5.00. Special miniature Battery pack $1.75. Extra tube $2.20 C.O.D. or money order. Electronic Manufacturers. Fifteenth and Greene. Augusta. Georgia.

COMPLETELY assembled crystal radio plus 100 foot antenna. Postpaid $1.00. J. Kennedy. Box 653. Boston. Mass.

ELECTRONIC Organ easily constructed from Radio parts. Plans $1.00. Quaker Radio. Box 68. Salem. Ohio.

"25 YEARS Experience in radio repairing at your fingertips for $1.00. I've repaired 45.000 radios and have perfected system you can follow step by step. My methods are far simpler than any other course published. Requires no calculations. Total price $1.00 postpaid or COD. Money-back guarantee. Ross Radio Company. 14615-B Grand River. Detroit 27. Michigan."

RADAR Crystals. Super-Sensitive. Free details. Hayes. Box 636-H. Santa Barbara. California.

AMERICA'S Best Buys. Radio Tubes 29c up. Free Bargain lists. Potter. 1314 McGee. Kansas City 6. Mo.

"RADIO-Table. Portable Model. parts. Write for latest Bargains. American Radionics. Wilkes-Barre. Penna."

IN Stock — No Waiting — Hallicrafters Short Wave Radios. S-38 $47.50: S-40A $89.50. Covers Broadcast and all short Wave Bands. Ideal for Short Wave Listeners. Send $5.00 deposit and we will ship COD for balance. Henry Radio. 11240 W. Olympic. Los Angeles 25. Cal. and Butler. Mo.

RADIO Tubes, parts wholesale retail large stock. Radio Mail Order Company, 46-13 188th St., Flushing, N. Y.

3 TUBE amplifier kit complete with tubes $5.75. E. J. Mangeri. 41-13 10th Street. L. I. City 1. N. Y.

24 BUSINESS OPPORTUNITIES

WOULD you pay 3%—first $350 made? Color-illustrated book "505 Odd, Successful Enterprises" free! Some offer occasional "day off." Work home. Expect something odd! Pacific-J. San Clemente. California.

IF you'd like to make $5,000-$10,000 yearly in the Collection-Credit Agency business, write us at once. Outstanding opportunity. Cole Associates. Syracuse 2, New York.

$25 WEEKLY working two hours daily. No canvassing. No Manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

START Home business making statuary, plaques, art goods, pottery, garden furniture, artificial marble flooring, liquid marble. Make flexible molds yourself. Amazing profits. Folder free. Creative Publishers. Box 236-M. Winnetka. Ill.

OPERATE profitable home business selling merchandise by mail. Fast sellers. Large profits. Powell Service, 5713 Euclid, Cleveland 3. Ohio.

RECAST old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

BIG Pay jobs in welding. Complete welding lessons and reference books, 516 pages, 41 lessons, $2.00 copy. Money-back guarantee. Hobartweld, Box P-1065, Troy, Ohio.

BOOKKEEPERS—Operate your own simplified "Dollar-A-Week" Bookkeeping & Tax Service. Full or spare time. Details free. Ellis, Box 203, Cedar Grove, N. Car.

MAIL Order Business course shows you how to make money, spare or fulltime. Teaches professional mail order technique —not penny-snatching schemes. Fascinating 100-page illustrated Success-Catalog Free! Write—Nelson Company, Dept. 4-01, Chicago 5.

LEARN Shell Jewelry Manufacturing. No tools or experience needed. Learn-earn within a week! Complete home instruction course, beautifully photographed, shows how to make 75 styles of Pins, Earrings, Brooches, Hair Ornaments, Dress Clips, Necklaces, Bracelets, Candy Dishes, Wall Plaques, Ash Trays, Candle Sticks, etc. Includes Pearlizing, Golding, Dyeing, Luminous methods. Illustrates 55 species of sea shells. Lists hundreds of raw materials with wholesale prices. Complete course $1.00, postpaid. Beginner's Kit, $3.00 ($3.50 in Canada). House of Gifts, Box 4550-AS, Coral Gables, Fla.

ASTOUNDING modern mail order plans. Brings quick profits. Darrah, Orono 8, Me.

GOT $24,500 Using "Schemes" from "Schemer" Magazine, Alliance, Ohio. 49th year, $1.00. Three samples 25c.

WANTED unused U. S. Postage Stamps, small discount. Advance Stamp Co., 24 East 23 St., New York.

COLORGLAZED Concrete Pottery made without molds. New, low cost, patented method. Cemetery products, novelties, tiles, floors, etc. Basement leaksealing. Other money-making projects. Booklet, details free. Men only. National Potteries, Fergus Falls, Minnesota.

MANUFACTURE costume jewelry at home for profit, hobby, therapy. Free wholesale supply catalogue. Instructions. Florida Supply House, Bradenton, Florida.

BUYERS Wanted for plaster novelties. Painted — Unpainted. Retail — Wholesale. Write today for free information. Bing Products. 88X2B Broad. Boston 10. Mass.

MOLD-MAKING. Plaster casting. Money-making Business. Literature Free. Kemico. Park Ridge. Illinois.

COMPOSITION Flooring—made in most colors. Lifelong. Soundproof. Resilient. Flexible Molds. Cast novelties. plaques. statuary. Big money—your own business. Catalog Free. Write—Bing Products, 88B3A Broad Street. Boston 10. Mass.

SPECIALTY Manufacturing, the big money business that can be operated anywhere, start on a very small capital; we supply dependable formulas and complete instructions; get interesting Free booklet, "Money-making Opportunities in Specialty Manufacturing." Howard Robinson, Ph. G., 1300-B S. Ohio St., Sedalia, Mo.

QUICK Money! "Repairing Car Batteries." At home! Easy too! Write, Batteryman, Grand Junction 1, Colorado.

TYPEWRITER Repairing instructions. standard typewriters. Webers', Box 1008. Canton. Ohio.

I MAKE big money in the mail-order business. You can do the same at home with copyrighted system. Write me I'll tell you how. F. Little. Glenshaw. Box 8. Pa.

FLEXIBLE Molds to order, also originals. Professional course manufacturing molds and cast novelties. Latex, lacquers, flocks, flocking equipment, supplies. Plastics. Box 1574, Boston 4, Mass.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

137 PLANS to make money local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

AGENTS or exclusive distributor for cigarette lighter mfg. MacGregor, 802 89th, Tahoe Valley 15, Calif.

UP to $1500 yearly selling by mail in spare time interest you? New ideas and plans every month. Details free. Idea of Month Club, 3023-R Greenmount, Baltimore 18, Md.

MAKE strange plastics—1c pound. Makes durable attractive floors, walls. Build with waste—Save half. Bays Laboratory, Oklahoma City 9.

25c BRINGS you lots of Mail Catalogs, magazines, opportunities for one full year. James "E" Summerson Agency, 621 E. Church St., Lock Haven, Penna.

HOW To Set Up and Run A Mirror Shop! Resilver Mirrors. For Price write—John Sprinkle, V90, Marion, Indiana.

DO You Sell By Mail? If in, or you contemplate starting a mail order Business, you need and should read Mail Order Business's Leading Magazine, The Monitor. Copy prepaid for quarter. Write today. Shutt Agency Service, Dept. A, 506½ S. 15th St., New Castle, Ind.

A natural for hobby dealers. Bic-Keen—the atom bomb game—naval strategy. $1.00 each for minimum of 10. Bic-Keen, 1456 Penobscott Bldg., Detroit 26, Mich.

BIG Money In Vending Machines—Smallest capital start brings immediate profits that build permanent profitable business. Starting instructions free. Becker Vendors, 105-P Dewey, Brillion, Wisc.

WHY Job Worry? Learn Electroplating. Highly Paid, uncrowded. Interesting Business. Gold, Silver, Nickel, Chromium, etc. Send Postcard for Free booklet and proof. Plater Hyde, Dept. SC P. O. Box 176, National City, Calif.

EXCLUSIVE Manufacturing Franchise. Offered by large corporation. Own your own business. Manufacture patented, concrete slabs, in your city. For low cost homes, floors, walls. Roof and farm buildings, concrete silos and billboards. Slabs bolt together. No expensive equipment required. All you need is a concrete mixer, vibrating table and our steel forms, and a building with yard space. Responsible persons and companies are invited to investigate this valuable and exclusive franchise rights in your city. Don't miss this opportunity. Investigate this profitable business. Wire or write for free folder. Fire Proof Construction, Inc., 880 West 3rd Avenue, Columbus 8, Ohio.

RED latex for making rubber molds! Cast plaques, novelties, bookends! Free sample! H. Tooker, Hamilton 21, Ohio.

MAIL Order Offers increased Income. Independence. Unlimited Possibilities. Free literature. Manhattan House, 126-S Lexington, New York 16.

GET, use, sell Scheall's guaranteed Fire Extinguishers. Sold, used throughout America. $1.25 everywhere. Tremendous earnings. Scheall, Box 263, Duluth, Minn.

$300 MONTH, sparetime $10 starts you. Guaranteed plan 15c. Cue, Box 256, Batavia, N. Y.

"PLANNED And Profitable" mail order selling. New, different work-book of ideas and instruction for beginners, aspirants, established dealers. Send quarter for copy of leading mail order trade magazine and details special free subscription offer. National Publishing Co., 356 So. Broadway, Suite 706-PS, Los Angeles 13, Calif.

BRONZING and Metallizing baby shoes! Gold, Silver, Copper, Nickel, Bronze, Pearl, Ivory and "Luminous glow" colors! Big profits! New Field! Details free! Write R. O. Morgan, Box 349, Long Beach 2, Calif.

FELLOW Workers—Down with Bosses—Start own business—Be Independent—Booklet describing 137 Tested Plans, free. P. Padney, 307 York St., Jersey City, N. J.

BECOME 1947's successful publisher of profitable weekly newspaper. "Know-How" explains all. Free literature. Success Publications, (Dept.-B), 15870 Wisconsin, Detroit 21, Michigan.

COMPLETE Mail Order Course! Information you cannot afford to be without. Limited supply! Reasonable. Stamp. Versatile Enterprises, Westfield, New York.

SUPER X liquid molding rubber. Sample jar 25c, quart $3.00. Gallon $10.00. Free instructions. W. Wooley, 115-B, Donald, Peoria, Ill.

BABY Shoes preserved. Formulas, instructions, $1.00. Novelty Bronzing, Box 56, Hyde Park 36, Mass.

SYNTHETIC Latex with Neoprene base for making flexible molds! Quick drying! Safe! For home, classroom, or industry! Quart $2.00. Gallon $5.95. Full instructions. Beginners booklet on molding and plaster casting 25c. Plastercraft Supply Co., 1406 E. 43rd St., Cleveland 3, Ohio.

REDUCING Salons make money. Start at home. We supply automatic equipment. National Products, Portland 2, Oregon.

METALIZE Baby Shoes. Correct Modern Method. Information. Stamp. Universal, Box 1076-B, Peoria, Ill.

BIG profits and your own business casting latest 1947 Metal Toy Autos, Airplanes, Ashtrays, Savings Banks, etc., Enormous wholesale and chain store demand keeps manufacturers busy. Spare or full time. No experience or special place needed. For full information write Metal Cast Products Co., Dept. E., 1696 Boston Road, New York 60, N. Y.

INFORMATION Locating articles and products (Wholesale) etc. Mention Requirements. National, 3537A South Hoyne, Chicago 9.

"INVESTIGATE the ever-growing mail order field! Thousands have. Write Marshall, Box 655, Centralia 12, Wash."

SCAFFOLDS—Amidon, adjustable, tubular metal. Amidon Engineering Co., Elyria, Ohio.

SILVERPLATE Mirrors—make mirror novelties. $1.00. Universal, Box 1076-B, Peoria, Ill.

COLOR Concrete with chemicals. Make Hollywood style pottery; home or shop. Marbling, water-paints. 10c brings sample, pictures. Hollywood Cementcraft, 8530 Wonderland, Hollywood 46, Calif.

START profitable Mail Order business. Write Tes-Co. Box 189-SH, Wilkes-Barre, Pa.

HANDYMEN—Earn money home operating Community "Fix-it" Shop. Write, Stafford, 708 Rawlings, Carbondale, Ill.

MEDICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-X, Austin, Texas.

HOW and Where to obtain capital. Particulars free. Star Service, Wapakoneta, O.

$46 FROM Square Foot Plywood: Jigsaw necessary. Write, Woodarts, X-47, Bridgewater, Mass.

INCORPORATE in Delaware. Many advantages. Free details. Corporation Fiscal Company, Inc., Delaware Trust Building, Wilmington, Delaware.

BIG Profit local business supplying domestic service needed everywhere. Permanent. We start you, furnishing everything. Write. Textile, Inc., 11106-B South Longwood, Chicago.

SIMPLE mold making instructions 50c. Advanced $1.00. Rubber Latex for molds. Apex Plastic Products, 1915 Lunt, Chicago.

BE Your Boss. Bronze Baby Shoes. Make bronze statuary, novelty castings, liquid marble, flexible molds. New methods—easier, quicker. Very Profitable. Productive Arts Co., Dept. S-4, Box 221, Seattle 11, Washington.

START Mailorder Bookshop—Everything furnished; publisher cooperation. 25c brings booklet, exclusive setup, samples, exciting ideas. General Publications, Ossining 1, New York.

RUBBER Moulds for casting novelties. Latex for making Molds. Use thoroughly tested and approved products. Eastern Latex Laboratories, Box 153, Mattapan 26, Mass.

UPHOLSTER Build furniture. Book $2.15 prepaid. Educational Service, Box 385-B1, Lombard, Illinois.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late methods. No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. E, Decatur, Illinois.

FREE—Shaving Cream Formula. Literature. Moon, East Broadway, Fulton, N. Y.

REMOVE broken keys from Auto, Houselocks. Be your own Boss. Get $2.00 up for each job. Tool, instructions 35c. Weitman, 2212 Avenue "X", Brooklyn 29, N. Y.

"OPERATE most profitable mail order business. Splendid opportunity. Free details. Rico Plans Co., 1023A Wood Ave., Easton, Penna."

EARN $250. monthly making mail and personal investigations. Full or spare time. Tracers Service Bureau, Suite 408, 1124 2nd Ave., Minneapolis 2, Minn.

LEARN Piano Tuning, Repairing, at home. Tremendous field! Piano parts, tools furnished. Established 1935. Empire School of Piano Tuning, 606-A East University Ave., Champaign, Ill.

200 Money Making Deals. Plans—Rare formulas—Schemes. Folio Free. Formico Prod., Box 572, Dayton, Ohio.

INVESTIGATE Mail Selling! What's the one best thing to sell, happily, honestly, profitably? We know! Get free particulars, free samples. What-To-Do Shop, Box 1082, Tacoma, Washington.

DO it with Sea Shells. Big profits. Werts, 1429 56th Avenue, Oakland 3, California.

START home plaster novelty business. Amazing course tells how. Literature free. W. Belfort, Engineering Bldg., Chicago 6.

START a clock shop while clock repairing is booming. Our easy to learn home study course with pictures and illustrations teaches you how to repair all kinds of clocks. Information free. Houston Clock Shop, P.O. Box 5086B, Houston 12, Texas.

TYPEWRITER Repairmen urgently needed. Earn $40 to $50 weekly spare time. Our easy to learn home study course teaches how to repair typewriters. Write for free information. Houston Typewriter Repair Service, P.O. Box 5357, Houston 12, Texas.

MAKE Shell Jewelry—Easy, profitable. Illustrated book instructions 75c. Free Catalogue. Florida Shellcraft Co., Box 1840, Sarasota, Florida.

VITAMINS! Big Sellers! Guaranteed Finest! Your labels. Dr. Swearingen, 9128S, Station S, Los Angeles.

YOUR Business—Earnings $50 per day and up—Investment $875 to $1000 for merchandise and equipment—Year around business—Employ others to work for you—Exclusive territory—Many ways to get business. Rejuvenating, Cleaning Rugs, Carpets, Upholstery (All Kinds)—Mothproofing. Write P. Hinson & Company, Inc., Richmond, Indiana.

BY Now You surely must have heard of Colorado's Fabulous Oil Boom. Would you take shot at $1.000 to $20.000 on investment of $140 in easy payments? This chance will never come again. The opportunity is limited to a definite number so write me today and I'll take care of everything for you. Dyer, 1835 Champa, Denver, Colo.

OPERATE Extremely Profitable "Employment Agency." Easily-Learned. Write, Hunt, Box 308, Burlingame 2, California.

BRONZE Baby Shoe Mountings and Supplies. All metal Bookends, Ash Trays, Picture Frames, Etc. Wholesale only. Hollywood Bronze Supply, 1770 N. Vermont, Dept. 112, Hollywood 27, California.

START home business. Collection Profitable Plans. Free Particulars. Twin Parks Y, Box 4696, Dallas.

NEW! Make 3 Dimensional Pictures at home. Instructions and materials furnished. Particulars free. Pixilated Picture Co., 712 S. Walker, Oklahoma City 4, Okla.

MAKE $6.00 an hour Sharpening Lawnmowers. Details 10c, Angle Slide, Box 582, Binghamton, N. Y.

SELL Pocket Yearbooks! Over 150 pages. Clothbound. Technical Data, Space for Memorandums, appointments, dairy, cash accounts, addresses, etc. Six for $1. Sample 25c Postpaid. Howard-Daniel Co., Box 3, Hempstead, N. Y.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

YOUR own Hustling Business with 75c profit on every dollar merchandise sale, plenty of repeats. Work locally or by mail. New complete plan tells all. Write: Einert Sales, 150-23 115 Ave., Jamaica 4, N. Y.

U. S. Mail Dealer, B-2162, Corpus Christi, Texas. Monthly, plans, tips, formulas. Year $1.00. Three copies 25c.

17 DISCARDED articles—waiting for you to turn them into cash. Charles, 12 ED, Norwood, Ohio.

OPERATE profitable mail order business. Write, Walter Service, 4159-B East 112th, Cleveland 5, Ohio.

METALIZE baby shoes! Learn this money making business from Nationally recognized consultant. Get "know how" from outstanding authority! See Kushner Ad., page 59.

2000 NEW representatives needed, some sections exclusive territories—Big opportunity small investment. Midwest Drug Company, Inc., Columbus 15, Ohio.

1947 GIGANTIC Directory of Opportunities, Advertisers Supplies, Sources, Trade Information, Mail Order Ideas, Products, Wholesalers, Valuable tips—just published! Descriptive literature Free. Wilkin & Co., Hillsboro 2, Ohio.

PROFITABLE mail order business can be yours. Details Free. Box 63-B, Station H, Buffalo 14, N. Y.

FOLKS—Do you want an independent income? Then send for full particulars about, "The Very Thing To Do". Spare time work. No selling. You can do it. International Mail Service, P. O. Box 295, Flint, Michigan.

EARN $126. weekly at home. $1 brings samples, details. Money back guarantee. Box 72, N. Y. C. 16.

88 MONEY MAKING OPPORTUNITIES

WOULD You pay 3%—first $350 made? Color-illustrated book "505 Odd, Successful Enterprises" free. Expect something odd! Pacific-G, San Clemente, California.

ELITE Collection describes 137 money-making plans; local, mail order. Particulars free. Elite Co., 220-A Grand St., N. Y.

EARN money at home—steady income—Write Successful Income Builders, 508-B, Hollywood 28, California.

$25 WEEKLY Working two hours daily. No canvassing or manufacturing. Lycke, Box 2471, Cleveland 12, Ohio.

MAKE Perfume. Make Money. Free book tells how. Lawson, 21 Joiner, Saint Augustine, Florida.

START Your own business! Big money manufacturing novelties, plaques, statuary. Free catalog. Write Bing Products, 88-B3B Broad Street, Boston 10, Mass.

AT Home—Your own manufacturing business; making popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. T-6011, Loveland, Ohio.

FREE Literature describing 20 money-making plans. Dallis Ruth, Wheelersburg, Ohio.

$246.50 MAKING baffling secret device without skill, machinery, from former top priority war material costing $1.50! Guaranteed simple, revolutionary new discovery, unbelievably profitable. Universal appeal. Frank, illustrated proofs, free! Rolls Enterprises, 115 W. 16th., New York 11.

"THERE'S Big Money In Junk," and repairing Car Batteries! Batteryman, Grand Junction, Colorado.

YOUR town is ripe for a profitable collection agency. $5000 first year easily possible. We train you, coach you, get you started and help develop your business. Send $1.00 for starter course, or ask for facts. American Collection Associates, 226 State St., Schenectady 5, N. Y., Dept. S.

500%-1000% profit and up. Your own interesting service business. Tremendous demand everywhere. Experience unnecessary. We teach, help, supply everything. Practically no capital needed. Resistal, Inc., 1757-A Sunnyside, Chicago 40.

EXCELLENT profits raising mink. Details furnished. Franklin Young, Riverhead, N. Y.

SEWING Machine Repairmen make big money lifetime. Start neighborhood shop. Complete repair manual, covering all makes, $1.98 postpaid. Money Back Guarantee. Sewmachine Serviceman, Hamilton 10-A, Ohio.

A $100-A-MONTH hobby at home! No soliciting, no mail order, no meeting people. Easy, enjoyable pastime. Details, 25c (refundable) Laura Dickson, 808-PS Elizabeth St., Anderson, S. C.

PRIZE Contest Fans Reap Rich Rewards. Enclose 3c stamp. National Contest Bulletin, Box 2685-S, Miami 31, Fla.

VETERANS Only. Earn money, spare time. No selling. Disabled welcomed. Veterans Cooperative, LaGrange, Georgia.

$50—$100 WEEKLY! Almost no Capital, no selling or manufacturing. Instructions $1.00. Pamats, Brooklyn 21, N. Y.

MAIL order opportunities. Sample 10c. Kerk's Supply, Box 454, Wellston 12, Mo.

MAKE money six ways. Get orders by mail $1.00 to $2.00. Keep half. Complete Guaranteed plan, 25c. Franklin, 22219-S Telegraph, Detroit, Michigan.

500 TERRIFIC money-making propositions, offers, ideas. Details free. American Success Aids, Dept. C., Bellmore, N. Y.

METALLIZE baby shoes. Further information free. Metal Crafts, 5501 Suwanee, Tampa 4, Fla.

SHELLCRAFT Sells! Have fun making genuine marine shell jewelry. Make money selling to stores and friends. Save money buying direct from wholesaler. Large kit $1.00. Instruction free. Eastern Shellcraft, 985 Myrtle Ave., Brooklyn 6, N. Y.

FREE premiums, wholesale Catalogue. 10c. Holm Sales, Oaklandon, Indiana.

MONEY Making Opportunities, exclusive supply sources. Benefits, etc. Satisfaction or money back. Joseph M. Inman, Darrington, Washington.

WIN money on contests advertised in every magazine and on radio. General Contest Magazine, published monthly, gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609-A East 5th, Duluth, Minn.

LADIES, Want independent income? Write for particulars about The Very Thing to do. No selling. Spare time work. West Agency, Box 2115-S, Pueblo, Colo.

DETECTIVES Earn Big Money. Experience unnecessary. Particulars free. Wagoner, P-125, West 86th, N. Y., N. Y.

SHELLCRAFT Instructions—Free! Make beautiful seashell jewelry! Wholesale Catalogue of complete line shells! Plastic discs! Animal Shapes! Pinbacks! Earrings! Cameos! etc. (Buy Direct). Pace's, Box 279, Bradenton, Florida.

"NEW! 5c material, 5 minutes work makes $1.00 for you. Instruction $1.00. Buzan, Lacomb, Oregon."

"TIMELY Tips Magazine", Paulding, Ohio, includes moneymaking Plans, ideas, business opportunities, monthly, 10c. 19th year. $1.00. Trial Six months, 50c.

"GET ahead financially. Complete Success Course $3, shows how 4 lessons $1; details free. Satisfaction guaranteed. Research Bookshop, 89 Raynor Street, Freeport, N. Y."

A Business of your own! Go into business for yourself. Start at home in your spare time. We can help you! Details free. Rennolet, 1022-B 9th Street, Rock Island, Ill.

A Factory in your own home or garage; Manufacture and sales rights mechanics waterless hand cleaner; $500-$1000 monthly; No Special Equipment Necessary. Schaffner Laboratories, Pittsburgh (2), Pa.

ELECTRIC Clocks are everywhere you go, buildings, homes, parking-lots, factories. Repairs increasing. Our easy to learn course with pictures and drawings teach You how to repair these clocks. Electronic Supply Co., Box 2350-B, Houston 1, Texas.

WIN Contest Money. We show you how. Send 3c stamp for "Making Contesting Pay" and entries that won $10.000. Townsend Contest Service, Urbana, Ill.

WILL Give $1.000 for one Bible text! Immediately. Positively. No schemes or red tape. Guaranteed! Free details. Paul M. Jenkins, 1719 Larrabee, Chicago 14.

MANUFACTURE costume jewelry at home for profit, hobby, therapy. Free wholesale supply catalogue. Instructions. Florida Supply House, Bradenton, Florida.

MAKE Money! Collection 137 Plans. Booklet Free. Twin Parks Y, Box 4696, Dallas, Texas.

DON'T cheat yourself — 59 unusual money-making plans. Charles, 12 EF, Norwood, Ohio.

FIREWORKS. Big discounts. Free price list. Mackay Specialties, Mackay, Idaho.

VETERANS! Loan Guaranty offers amazing opportunity for financial security. See Page 48.

EARN Up to $2.000 year, inventing simple items for special cash markets. Ideas only. No patents. Hendrickson, Argyle (8) Wisconsin.

EARN money Evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle (2-B) Wisc.

59 FORMULAS, PLANS, ETC.

137 MONEY-making plans, also formulas for salable products. Descriptive booklet free. Elite Co., 220-A Grand St., N. Y.

FORMULAS—All kinds. Latest money-makers; literature Free. Kemi-Kal, Park Ridge, Ill.

10,000 FORMULAS and Trade secrets. Free Literature. Stillmans, 555 Kingston Ave., Brooklyn 3, N. Y.

"NEED Chemists? Products duplicated? Formulas? Analyses? Consulting Scientific Company, Swarthmore, Pennsylvania."

100 SINGLE ingredient formulas 25c. Tes-Co, Box 189-SG, Wilkes-Barre, Pa.

ICELESS Ice! Colder! Cleaner! Cheaper! Instruction 25c. Duffy, Covington, Ky.

FORMULAS — Latest Best. Analysis. Giant formula catalog and chemical Instruction Sheet 10c. Refunded first order. E-Belfort, Engineering Building, Chicago 6.

10,000 FORMULAS, Processes. Wide variety, free details. Ray's Supply, 1741 Stephens, Kalamazoo 81, Mich.

FIFTY (50) single ingredient—formulas only—$1.00. Kayes, Box 13, Sta. W, Brooklyn, N. Y.

106 PLASTICS

PLASTICS—7 colors sheets and rods. Send stamp for price list. Hanson Plastics, 7625 South Parkway, Chicago 19.

NEW liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Manual tells how. Send $3.35 for complete 20 project kit including one pound liquid Castolite. Castolite, Dept. G-24, Box 211, Kenilworth, Ill.

GUARANTEED: We are America's lowest priced plastic supply house. Write for free price lists: Allcraft Products, Hempstead, New York.

PLEXIGLAS masked sheets 12" x 12" 1/16" $1.00, 1/8"—$1.25, 3/16"—$1.55, 1/4" —$1.85. Include 10% postage. Dyes, Rods, cements, shells, jewelry findings, tools, buffing compounds, free listings, Craft Plastics, Box 129-S, Somerville, N. J.

PLASTICS, Free List. Swiss Music Box Units $3.50—New Plexiglas Manual $1.50. Plastic Supply Co., 2618 St. Louis Ave., Dept. PS52, St. Louis 6, Mo.

PLASTIC Tablecloth Covers, Curtains, Drapes, Baby Pants, Bowl Covers and other Plastic Articles selling like wildfire! Make big money Now! Free Details. Write Plastics, Dept. 59-F, 206 N. Fourth, St. Louis, Mo.

NEW Crystal clear and colored Plexiglas for 15 projects. Full instructions, accessories—Plexikit #1, $5.00 in U.S. Kosto, Washington 7, D. C.

HOME Training through "Working With Plastics", $1.25, covers every step, every material. Plastic Hobby Kit: 2 lbs. Lucite, Plexiglas, bottle cement, 3 bottles plastic dye, $3.25. (Free: Complete instruction book.) Modern Technical Book & Tool Co., Dept. MS, 55 West 42nd Street, New York 18, N. Y.

MAKE money assembling our pre-fabricated plastic kits. Sample Kit 50c. Catalog free. Fabros, Box 156, Station F-2, Buffalo 12, N. Y.

Copyrighted material

FREE Offer—"A Handbook of Plastic Information." Informative, profusely illustrated, non-technical booklet. Thousands sold at 50c. Get yours Free. Write for details. Barnett Specialty Co., 5104 Hollywood Blvd., Hollywood 27, Calif.

PLEXIGLAS—first grade, all thicknesses. Excellent Salvage. $1.00 lb. Cement. Dyes. Jewelry Findings. Speedy Service. No charge for cutting to specifications. Free Listings. Novalte Plastic, Box 106-PS, Brooklyn 19, N. Y.

33 CHEMICALS AND APPARATUS

LUMINOUS Paints will glow in dark. Six colors. Fairmount Chemical Co., 136 Liberty St., New York City 6.

THE House of Winn, home of supplies for amateur chemists. See Winn's New Idea chemical kits and apparatus outfits for home experimenting. Send 10c for retail catalog. Established 1931. John H. Winn, Dept. 607, 124 W. 23rd St., New York 11, N. Y.

CHEMICALS-Lab. Supplies New Catalog 10c. Mel-Glo Chemical Co., 258 Fourth Avenue, Brooklyn 15, N. Y.

CHEMICALS and apparatus for industrial, analytical, and private laboratories. Complete supply service for correspondence school students. Send 3c for catalog. Dept. M-26, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 7, N. Y.

NEW laboratory Supply Catalog of Chemicals and apparatus. Contains over 5000 items with illustrations, 212 pages. Send 50c. Standard Science Supply Co., 1232 No. Paulina St., Chicago 22, Ill.

HANDBOOK for Chemical Experimenters. Hundreds of experiments; illustrated: 50c. Experiment Booklet, 15c. Supply Catalog, 5c. Reading Scientific Co., Reading, Pa.

"FREE Scientific Catalog. Fourteen hundred exceptional items. Tracey Laboratories, 1907 Harrison Street, Evanston, Ill.

SPECTROSCOPE For Quick chemical analysis $3.00. Cutting Co., Box 457, Campbell 2, California.

CHEMICALS, ounce quantities, apparatus, catalog 5c. Fleischer's Laboratories, Everett 49, Mass.

SAVE money, time, effort! Plan your laboratory. Send 25c for copy "Planning Your Laboratory". Pilgrim Chemicals, 2435 So. State, Salt Lake City 6, Utah.

LABORATORY Supplies At Wholesale Prices. Chemistry, Biology, Physics, Geology. Catalogue 10c. National Scientific Company, Established 1908, 2204 W. North Ave., Chicago 47, Ill.

68 HELP WANTED

MAKE More Money selling individualized buckles, belts, tie holders, cap badges: Choice of 2000 emblems. Quick profits—repeats. Special Outfit Offer, write Hook-Fast Products, Dept. B, Columbus 6, Ohio.

EARN Up To $480 Month part or full time keeping books for small firms. Simplified System. Write Tax-Saver System, Dept. A, Ft. Worth, Texas.

5 AGENTS WANTED

WOULD you pay 3%—first $350 made? Color-illustrated book "505 Odd Successful Enterprises" free! Proven! Work at home, office. Expect something odd! Pacific-H, San Clemente, California.

GOOD Paying Business Silvering mirrors, plating autoparts, reflectors, bicycles, bathroom fixtures, etc., by late method. No tanks or shop required, outfit furnished. Free Booklet. Gunmetal Co., Ave. G, Decatur, Illinois.

FREE! Latest issue Opportunity Magazine, Salesman's Guide. Inspiring, constructive. Shows how to earn money selling for others or in your own business. Hundreds postwar opportunities. Send name and describe what you have sold or are selling. Illustrated copy sent Free. Opportunity Magazine, 620 N. Michigan, Dept. 18, Chicago 11, Ill.

SELL Personalized soap. Name on every cake. Ideal for gifts. Get sample offer. Dunbar Soap, New Brunswick, N. J.

SELL clip Cigarette Holders & 20 filers. A. I. I. Mfg. Co., Hartington, Nebr.

LICK After-war layoffs; Start own business; home, office. Booklet describing "Collection of 127 Tester Plans" free. Elite Co., 220 Grand St., New York.

AGENTS—300% profit selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 437 N. Clark, Chicago.

SELL Greeting Cards, Display Signs, Pictures, Books, Novelties, Big Profits. Bulletin Free. Elfco, 432 North Wells, Chicago 10.

SELL Personal Initialed Individualized Belts, Buckles, Cap Badges, Tie Holders, 2,000 emblems to choose. Fast profits. Repeats. Write today special outfit offer. Hookfast Specialties, Box 1425, PS, Providence, Rhode Island.

AMAZING New Zipper Shoe sells on sight. Big profits for salesmen. Leads line 200 splendid styles. Territories open. Get Free Sample Outfit. Write Victor Thomas, Dept. V-800, Chippewa Falls, Wisc.

90c PROFIT Each $1.00 Sale, Sell Positive mothproofing solution to housewives, stores, agents. Experience unnecessary. Postal brings details. Kinford, Wayne 4, Pa.

AT Home—Your own manufacturing business; making popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. v-601, Loveland, Ohio.

$1. STARTS you in business. Sell DeLuxe ties, 100% wool interlining. Costs you only $7.00 per dozen, you make $5.00 Dozen. Send $1.00 for special introductory offer two DeLuxe ties. Catalog complete line Free. Philip's Neckwear, 20 West 22nd St., Dept. P-11, New York 10.

GOLD lacquered Window Sign Letters. Large Sizes Penny Each. New Foils. Absolutely Beautiful. Free Samples. Atlas, 544 W. 79th, Chicago 20.

MAKE money in your spare time! Helps furnished. Easy sales. Voluntary repeat orders. Liberal commissions. Write for Free Wholesale Price List Today! McGregor Magazine Agency, Dept. PS-7, Mount Morris, Ill.

"BIG bargains for big profits. Over 100 sensational values. Men's used suits $2.00, pants 35c, topcoats $1.25, Overcoats $2.00, shoes 20c. Experience unnecessary. Free wholesale catalog. Superior, 1250-A Jefferson, Chicago 7."

MAGIC Cleaner—Hotter than a firecracker. Saves Soap—Big Profits—Sample Free. Uco, 5007 Irving Park, Chicago.

GREETING Card Agents: "Line Up" with "Pines" for bigger, better and quicker profits. Rush name, address on postcard today. Box 32, Flushing 6, N. Y.

EARNING Less than $200 weekly? Boost income quickly. Fast selling celluloid price tags, metal moulding, menu covers. Every store, restaurant buys. Pricing Press, Dept. CX, 124 White St., New York.

START Your Own Business on Our Capital. Always your own boss. Hundreds average $6,000 to $25,000 annual Sales. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. F-U-PSC, Freeport, Ill.

JUST Out! History of World War II. Huge Volume. Popular price. Authentic text. Official photographs. Big profits. Riverside Book Company, Iowa Falls, Iowa.

AT Home—Your own business making-selling-popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. U-6013, Loveland, Ohio.

ENJOY lifetime security recommending best life and disability insurance. Write Reliance Life & Casualty Co., Dept. 1070, Phoenix 3, Arizona.

QUICK Profits selling full or part time, individualized buckles, belts, cap badges, tie holders, uniform shirts, caps, ties. Choice of thousand emblems. Sure repeat orders. Easy-selling outfit offer. Write Hook-Fast Co., Dept. 14, Roanoke, Va.

AGENTS to sell 6c Corona cigars best value in market $2.00 per box of 50 postpaid. Say So Co., 31 E. 18th St., New York 3, N. Y.

IT'S new! Every Auto owner will want one or two. Opportunity to really make money. Over 100% profit for you. Send $1. for sample, details. Peerless Sales, 913-R Main, Kansas City, Mo.

MILLIONS want foot comfort! Amazing daily profits. Sensational new arch support body-balancer for men, women selling like hotcakes. Experience unnecessary. Complete outfit free. Special deal to distributors, crew managers. Write: Colt Shoe Company, 244-C-6 Purchase, Boston 10, Mass.

AMAZING daily profits. Big repeat business. Sell top-quality, lowest-priced men's, women's hosiery, full, part-time. Experience unnecessary. Take orders. We deliver. Complete outfit free. Write Colt Shoe Co., 242-C6 Purchase, Boston 10, Mass.

50% COMMISSION, protected territory, guaranteed line of cosmetics. Box 291, Arkansas City, Kansas.

ADVERTISING Book Matches—Cash In On Political Campaigns—sell Union Labels matches. Cuts for all businesses and political parties—Free powerhouse selling kit—low prices—protection guaranteed on repeat orders—Cash Commissions. Superior Match Co., Dept. P67, 7530 Greenwood, Chicago.

BEAUTIFUL "Real Engraved" Brass or Alumilite Name Plates. Fast sellers 75c—your cost 25c. Samples of both, your name engraved, 50c. Details Free! Monroe Engravers, 681-W Redondo, Long Beach 4, California.

"PRESSURE Cookers." Now available. Selling like wildfire. Amazing profits. Write quickly. Morris Mandell, Inc., 131-W W. 14th St., New York 11, N. Y.

A Natural! Make good money with fast-selling, new line Plastic Tablecloths and Women's Aprons!—Also novel, Embroidered Cotton Pillow Cases! Write for "interesting" details. Royalty Sales, Box 748-B, Passaic, N. J.

1200 FACTORIES offer you New Fast Sellers, take your pick, amazing opportunities, bigger profits, all found in New Agents' Buying Guide. Details free. Glass Pub. Co., Ellwood City 10, Penna.

BALL Point Pens Wholesale To Stores. Price List Free. Sample Pen $1.00. Friendly, 17 South Penn Ave., Phila. 11, Penna.

GREETING Cards: Easy money, quick. Free literature tells all! Evers, Elmhurst, N. Y.

POWER Lawn Mowers. Big reduction. Delivered. Catalog Free. Rotacut, M-2015, Ex. Springs, Mo.

SELL Stewart's E-Z Silver Detarnisher to Hotels, Restaurants, Public eating places. Detarnishes, cleans, brightens, in one operation. Takes the place of soap and polish. No rubbing, brushing, polishing or boiling. Saves 100% time, labor, and money. Every demonstration a sale and steady repeat customer. Protected territory. No experience necessary. Factory to you. A postal card will bring you "Once in a lifetime road to fortune," full particulars. F. P. Stewart, Manufacturer, P. O. Box 692, Miami Beach, Florida.

IMMEDIATE Profits! Take orders for our beautiful Laminated Plastic Reproductions of any picture or negative. Full or part time opportunity for Big Earnings without investment. Free details. Gotham Products Company, Box 5427, Philadelphia 43, Pa.

LADIES' Genuine Alligator Handbags 12" x 9" $24.95 postpaid. $204. Dozen. Moises Rodriguez, Apartado 2497, Havana, Cuba.

AGENTS. Substantial profits. Repeat order products. Not mere 'job" but opportunity establish steady income. Additive Lubricant. Limitless field. Factories. Autoists. Service Stations. Fleet Owners buy big. Write Kidder Oil Company, LaCrosse 4, Wisc.

WONDER Cleaner—free sample! Other producers; unusual bubble bath—Glasklean. Sell homes, stores. Circulars furnished. Courco, 3829-H Delmore, Cleveland Heights 21, Ohio.

WE permanize baby shoes in 7 beautiful plastic, metallic finishes, low cost to agents, big profits, sample shoe 50c. Plastic Arts, 220 Suydam Street, New Brunswick, N. J.

Copyrighted material

FREE Water and our concentrates makes flavors, lotions, shampoos. 72 products, labels, bottles furnished. Qualco, F-20030 Russell, Detroit.

SELL an item that repeats, repeats and repeats. Grimebuster Mechanics Waterless Handcleaner. Our agents are making over $75.00 weekly. For details write Schaffner Laboratories, Dept. PS-2, Pittsburgh 2, Pa.

200 Money Making Deals. Plans—Rare formulas—Schemes—Folio Free. Formico Company, Box 572, Dayton, Ohio.

$3 FIRE Extinguisher sells wholesale or direct. "Fire-Killer", 101 Franklin, Syracuse 1, New York.

JOKERS Novelties and Tricks. Agents earn quick return. Request Details. Delrose Magic Products, 536 Sixth Ave., N.Y.C. 11.

IMMEDIATE Profits! Collection 137 Business Plans. Booklet Free. Twin Parks Y, Box 4696, Dallas.

AGENTS Wanted for our Slot Machines and coin operated amusement games in every town and community. Sell to clubs and homes, or start a route. Webb Distributing Co., Dept. P40, 6 So. Kedzie Ave., Chicago 12, Ill.

VETERANS: Flight training under G I Bill. Private, Commercial and Flight Instructor Ratings. Write for Information. Gottschalk School of Aeronautics, Adrian, Michigan.

CHRISTMAS Cards, Gift Wrappings, Stationery, Novelties, Personalized Papetries. Raum, 4154 Fifth Street, Philadelphia 40.

EASY money making opportunity showing friends famous Wear Wright brand Nylon Hosiery; Lingerie, Blouses, Sportswear, Greeting Cards. Tremendous demand, steady repeats, big profits. Four special outfit offers. Free Lingerie sample display card. Wear Wright Company, 1709 Arch Street, Dept. B, Philadelphia, Penna.

PROFIT Selling Genuine Imported Briar Pipes Direct to Consumer. Terrific Values. Samples, $1.00 each. Details: Abbot Pipes, 62-A East 87th St., New York, N. Y.

TO 100% profit selling Greeting card Box assortments. Details and Assortment sent on approval. Glorian, 515 East 45th Street, Brooklyn 3, N. Y.

WANTED Salesmen to sell drug stores. Write for new low wholesale price list on leading items. Latex Products Company, Box 507, Dept. A, Chicago.

HOUSE Numbers that glow in the dark. Luminous pictures, etc. Large mfr. wants factory representative. Wonderful new product. Fast seller. Free Product. Madison Mills, 303 4th Ave., N. Y. C.

SELL fans to restaurants, stores, offices, factories! Free Catalog. Precision Equipment Co., Long and Schubert Avenues, Chicago, Ill.

69 HIGHGRADE SALESMEN

FREE—New 42-Page Book Entitled—"How to Become a Successful Direct Salesman," written by salesmen for those who want to become salesmen and earn up to $100 and more weekly. Send penny postcard. Specialty Salesman Magazine, Dept. PS-3, 307 N. Michigan, Chicago 1, Ill.

AMAZING daily profits, steady repeat business selling Colt's famous Foot-Balance Shoes direct. Exclusive features make selling easy. 216 styles! Experience unnecessary. Patented Foot-O-Graph assures accurate fitting. Free Selling outfit. Colt Shoes, 601-C-6 Atlantic, Boston 10, Mass.

POCKET Pal: The All-Purpose Cutting Tool. Wagon Jobbers—Salesmen. Sell to retailers and jobbers. 50c seller. Steady repeat item. Exceptional profit. Sample 25c. Nelson Manufacturing Company, 222 W. Kellogg, St. Paul 2, Minn.

ADVERTISING Book Matches—World's largest direct selling Mfgr. of advertising Book Matches offers opportunity for profitable year 'round selling; Every business a prospect; No Exp. needed to start; Full or part time; Factory service; Low prices for high quality; Repeats; Sales Kit Furnished. Match Corp. of America, 3433-43 W. 48th Place, Dept. N-8, Chicago 32, Ill.

MANAGEMENT Engineering franchise available. Supervise salesmen, make surveys. Valuable training given. Sims & Associates, 120-SA S. La Salle, Chicago 3.

47 EDUCATIONAL AND INSTRUCTION

MODERN Welding School gives thorough training for one of industry's best paid jobs. Experienced instructors. Individual attention. Nonprofit institution. Qualified under G. I. Bill. Write for literature and details. Hobart Brothers Co., Box P-1067, Troy, Ohio.

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Company, Chicago 5.

HAVE your own office! Many earn up to $5,000-$15,000 Annually. Learn credit-collection agency business by home study course. Experience unnecessary. Write for Free bulletin. No obligation. Franklin Credit School, Dept. 203-F, Roanoke 7, Va.

BIG money rebuilding shoes. Help needed everywhere or start big-income business of your own. Learn practical, sure, easy way in 3 months. Anyone from 18-60 years can learn easily. Approved for G.I. training. Rush postcard today. Modern Shoe Rebuilding School, Est. 1927, 2935 Belmont, Chicago 18, Illinois.

HYPNOTISM. "How I Hypnotize" 25c. Dr. Lonk, Hypnotist, D-1619, Palatine, Ill.

PREPARE for civil service examination. Pay for course after securing position. Write Free School, Dept. PS-6 Kokomo, Ind.

WHY Don't You Write? Writing short stories, articles, etc., will enable you to earn extra money. In your spare time we teach you to write the way newspaper men learn—by writing. Free "Writing Aptitude Test" tells whether you possess the fundamental qualities essential to successful writing. Veterans: This course approved for Veterans' Training. Write today! Newspaper Institute Of America, Suite 566H, One Park Avenue, New York 16, New York.

OCCUPATIONAL Success Chart. How to Study Guide. Free. Prepared by college authorities. Learn how to make your own practical Home Study Course of every text in big educational catalogue. Send for free Chart and Guide today. Central Educational Service, Dept. B-36, 6009 Belmont Avenue, Chicago, Illinois.

BECOME a Doctor of Psychology or Metaphysics. Teach secret of contentment, happiness. Win degree of PsD. or MsD. Solve mental worries. Free book. College of Universal Truth, 5153-A N. Clark, Chicago.

RESORT hotel business offers permanent career, travel, beautiful surroundings. Write for booklet. Lee Hotel Institute, 12B South Market St., Boston, Mass.

LATEST—Learn precision casting. Centrifugal-wax elimination process. Vets Approved. McNair-Ryan School, 373 N. Western, Los Angeles 4, Calif.

PIANO Tuning learned easily. Piano Tuner, 75 Howard, Keene, N. H.

USED Correspondence Courses and Educational Books Bought, Sold, Rented. Catalog Free. Educational Exchange, Henagar, Alabama.

CLINICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-B, Austin, Texas.

AMAZING discovery: Learn Touch Typewriting quickly, easily. Postpaid $2.00. Typewriting Review and Speed Builder, $1.00. Walker, Box 394, Union, N. J.

FACTS, Figures, Faces, Stick Like Burrs! New Improved Supermemory Course. Write Thor Books, YC-6, Box 1210, Chicago.

CALENDAR 1753 to 2152. 35c. Tracy S. Newton, Decatur, Georgia.

SELF-Development home-study plan details and lecture free. No obligation. Dare to be a bigger personality. School of Psychology, 10th Floor, Washington Bldg., Louisville 2, Ky.

SPANISH. Learn at home. Most fascinating, complete, inexpensive course. Write ECS, 9140 Berri, Montreal, Canada.

SAVE money! Enjoy interesting hobby brewing beer at home. New manual furnishes instructions. Send $1.00. Scientific Publications, Box 317, Back Bay Annex, Boston, Mass.

LEARN Commercial Lettering at home. Fascinating, lucrative field. Free information. Joseph Jones, 932 Broadway, Columbus, Georgia.

3800 USED Correspondence Courses. Catalog 50c. EG Mfg., Elmsford N. Y. 2.

77 LANGUAGE OUTFITS

29 LANGUAGES by Linguaphone, Russian, Spanish, Portuguese—Direct Conversational Method for Mastering any language quickly, easily, correctly at home. Available under GI Bill of Rights. Send for free Book. Linguaphone Institute, 54 RCA Bldg., New York, CI 7-0830.

10 AUTHORS SERVICE

I WANT New Writers to cash hundreds of checks for $1 to $100, offered each month. The easiest way to write for pay. No previous experience necessary. Send for Free details. No obligation. Saunders M. Cummings, 467-S Independence Bldg., Colorado Springs, Colo.

NEW Writers Needed. Nonfiction material demand is booming. Many magazine editors buy features and "fillers" from new writers. Our Earn As You Learn lessons prepare you to meet their requirements. Experience unnecessary. Reasonable price, unexcelled service. Details, sample lesson free on request. Use postcard. No obligation. Comfort Writer's Service, 210RN S. 7th St., St. Louis 2, Mo.

25 BUSINESS SERVICE

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Company, Chicago 5.

MAIL forwarded from the Ozarks 25c each. A. Kerry, Noel, Missouri.

HOW To Collect Your Bills by mail without antagonizing customers. Tested Velm method gets results. Buy handy file folder once, use indefinitely. Money back guarantee. Complete $4.95 postpaid. Check or money order. Velm Pub. Co., Room 804, 342 Madison Ave., N. Y. 17.

TO Whom It May Concern: We will represent you in all principal cities of the world. Personal or business assignments $1 per hour. James W. Farley, Citizens Bldg., Cleveland 14, Ohio. Note: Would appreciate hearing from someone who wishes to enter this business in your city. Will send you assignments immediately. References exchanged. State qualifications.

NEW YORK address. Your mail received and forwarded. Confidential. Free details. Arlington, 131-R West 42nd, New York 18.

BUSINESS Representation. World's principal cities. Associates wanted. Universal-SA, Butler Building, Chicago 1.

CHICAGO Mail Address. Suite 665-S, 120 S. La Salle, Chicago 3, Ill.

HOLLYWOOD Mail—and Shipping Address—it pays. Scheun's Service, 4620 Hollywood, Hollywood, Calif.

30 CARTOONING, SIGN PAINTING, DRAWING AIDS

"HOW To Make Money With Simple Cartoons"—A book everyone who likes to draw should have. It is Free; no obligation. Simply address Cartoonists' Exchange, Dept. 1446-C, Pleasant Hill, Ohio.

TALENT Test Free. American School Commercial Art, Box 8066, Dallas 5, Texas.

SIGNS made easily. Instructions and ten sets modern alphabets, numerals, patterns. Sizes up to eight inches. All for $1.00. Co-operative Business, 7 West Madison, Chicago, (2).

MAKE Signs, 9 complete alphabet pattern sets, 3 complete numeral pattern sets and catalog $1.00. Sign Letter Distributors, P.O. Box 101, Mineola, N. Y.

FREE Catalog of Cartoon Markets, Cartooning Courses, Artists' Books and Materials. Write Now. Lawrence Publications, Box 22-C, New York 23, N. Y.

Copyrighted material

LEARN sign painting, be independent. Signways, 4933 W. Erie St., Chicago 44.

31 CHALK TALK STUNTS

CHALK Talks, Laugh Producing Program, $1.00. Illustrated Catalog 10c. Cartoonist Balda, Oshkosh, Wisconsin.

136 TYPEWRITERS

RECONDITIONED Typewriters, Printing Devices, Office Appliances Supplies Dixiegraph, King, N.C.

118 RUBBER STAMPS

3 LINES 40c, cushioned, indexed 50c; Signatures $2.00. Print-Right, Wauwatusa, Wisc.

FREE: Stamp Pad with $1.00 cash order for A "Clear View" indexed cushion mount rubber stamp with your name, address. Illinois Rubber Stamps, 5023 Broadway Chicago 40.

RUBBER Stamps. Buy direct from manufacturer. Literature free. Lee-Vall Press, Box 1242, Indianapolis 6, Indiana.

110 PRINTING OUTFITS, SUPPLIES

"PRINTOMATIC" Selffeeding Post Card Stencil Printing Duplicators $9.50 Up. Office Size Duplicators, Speedoprints, Hilcos, Excellographs $33.41 Up. Literature Free. Pittsburgh Typewriter Supply, 336 WE Fourth Ave., Pittsburgh 22, Pa.

GOLD Imprinter $3.25. Samples. 10c. G.P.E., 8 Walden, Cambridge 40, Mass.

HOME Made Presses. Write Riegel, 1111 Harrison, Philadelphia 24, Penna.

PRINTING equipment, type and supplies. Send stamp for details or dime for complete illustrated supply book. Kelsey Inc., X-8, Meriden, Conn.

INEXPENSIVE home-made printing press. Details free. Novelty Shop, Downsville, Louisiana.

"TIPS and Kinks." Copyrighted, for Printer, Publisher. $1.00. Alleman, North Tonawanda 12, New York.

PRINT At Home—Send 10c for Catalogue—Type, Presses, Supplies. Barnhard Co., 6 Columbia St., Newark 8, N. J.

109 PRINTING, MULTIGRAPHING, ETC.

FIFTY sheets, fifty envelopes, printed your name, address, 75c postpaid. Atlantic, Box 653-P, Rock Hill, S. C.

500 GUMMED Labels 50c; 1000—75c. List Free. Reed, Spiro 3, Okla.

FLASHY 3-Color Designs 14x22 window Cards carnivals, magicians, rodeos, dances, races, roller rinks, theatres, etc. $7.00 per hundred. Tribune Press, Box 551-A, Fowler, Indiana.

SEND 10c Now, for our 36 page pricelist—Refunded first order. McCall Press (PSM), 1326 South 27th, Omaha 5, Nebr.

"QUALITY offset printing at low prices. Speedy dependable service. Free samples. ABC Press, 1041-C Eighteenth Ave., Newark 6, N. J."

PHOTO-Offset, Printing, Multigraphing. Samples free. Mango Printing Company, 555-B, South 20th, Newark 3, N. J.

1000 QUALITY business cards, $2.95, prepaid. Correctly printed by skilled workmen. Cash or C.O.D. Walker Printing Service, Box 1298, Amarillo, Texas.

ENVELOPES 6¾ printed $3. thousand, in 5000 lots. Michel, Box 76, New York 16.

QUALITY Printing: Business, personal stationery. Prepaid delivery. Samples free. Mero Products, 99 Morrison, Punxsutawney, Penna.

CUT Printing Costs; 1,000 offset 8½ x 11 printed $3.95. 5,000, $15.75; larger quantities less; 48 hour service; samples, price list free. Fidelity Company, Parkersburg 12, W. Va.

100 8½x11 HAMMERMILL Letterheads $1.00 Postpaid. Envelopes same. Race Printing, Hudson, New York.

1000 BUSINESS Cards $2.45, 1000 6¾ Envelopes $4.95, 1000 8½ x 11 Letterheads $4.95, 5000 gummed stickers $4.95 (Postpaid). Dept. PS, Madison Printing Service, Madison, Ohio.

YOU Will Like our Quality! Samples. Mail Printing, S93, Danvers, Mass.

98 PATENT ATTORNEYS

INVENTORS: Without obligation, write us for information as to what steps an inventor should take to secure a Patent. Randolph & Beavers, Registered Patent Attorneys, 340-A Columbian Bldg., Washington 1, D. C.

INVENTORS: Write for free brochure "Evidence of Invention." Labiner, World Building, New York 7.

INVENTOR'S Guide free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York 7, N. Y.

INVENTORS—Patent Laws encourage the development of inventions. The Rules of Practice of the U. S. Patent Office advises—unless an inventor is familiar with such matters—that he employ a competent registered attorney, as the value of patents depends largely upon the skilful preparation of the specifications and claims. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No Obligation. McMorrow, Berman & Davidson, Registered Patent Attorneys, 1439 Victor Building, Washington 1, D. C.

PATENT and Trade-Mark Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommel, Registered Patent Attorneys, Suite 413, 815-15th Street, N.W., Washington 5, D. C.

INVENTORS: Learn how to protect your invention. The patent laws afford the inventor protection for the patentable features of his invention. The United States Patent Office advises the inventor to engage a competent, registered patent attorney to represent him. We offer inventors experienced, confidential service. Specially prepared booklet containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request —Without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 72B-D District National Bldg., Washington, D. C.

INVENTORS. For "Record of Invention" form, contact Carl Miller, Registered Patent Attorney, Woolworth Building, New York.

PATENTS—Trade marks. Irving L. McCathran, 316 McLachlen Bldg., Washington 1, D. C. Registered Patent Attorney.

PATENT—Protection for Inventors—detailed information and steps to take to secure patent protection for your invention will be mailed promptly without obligation. Victor J. Evans & Co., Merlin M. Evans, Registered Patent Attorney, 241-G Merlin Building, Washington 6, D. C.

C. A. Snow & Co.—S-427, Snow Building, Washington 1, D. C. Registered Patent Attorneys. Write for information.

58 FOR INVENTORS

INVENTORS: Learn how to protect your invention. The patent laws afford the inventor protection for the patentable features of his invention. The United States Patent Office advises the inventor to engage a competent, registered patent attorney to represent him. We offer inventors experienced, confidential service. Specially prepared booklet containing detailed information concerning patent protection and procedure with "Record of Invention" form will be forwarded to you upon request —without obligation. Clarence A. O'Brien & Harvey Jacobson, Registered Patent Attorneys, 72A-D District National Bldg., Washington, D. C.

THE Inventor who believes he has a new and useful invention, and needs advice, should consult a competent registered patent attorney. Without obligation, write for full information on how to secure Patents and Trademarks. Randolph & Beavers, Registered Patent Attorneys, 340-E Columbian Bldg., Washington 1, D. C.

HIGHEST Royalties and cash for your inventions when we market them. Free particulars without obligation. Universal Marketing Co., 126 Lexington Ave., New York 16, N. Y.

"INVENTOR'S Guide" free on request. Frank Ledermann, Registered Patent Attorney, 154 Nassau St., New York 7, N. Y.

INVENTORS: Avoid unnecessary expense, Write for free booklet explaining how our Consulting and Advisory Service can assist you in deriving greatest profit from inventing. Institute of American Inventors, Dept. 30-A, 1926 Eye St., N.W., Washington 6, D. C.

PATENTED, Unpatented inventions promoted. M. Joyce Humphries, 1424 Landtitle, Phila 10, Penna.

INVENTORS—Patent Laws encourage the development of inventions. The Rules of Practice of the U. S. Patent Office advises—unless an inventor is familiar with such matters—that he employ a competent registered attorney, as the value of patents depends largely upon the skilful preparation of the specifications and claims. Write for further particulars as to patent protection and procedure and "Invention Record" form at once. No obligation. McMorrow, Berman & Davidson, Registered Patent Attorneys, 1438 Victor Building, Washington 1, D. C.

INVENTORS . . There is absolutely no legal way to protect your invention without a patent. Learn how to protect and put your unpatented invention into money-making form and receive my selling assistance. Buyers waiting. I save you considerable in patent application cost. Easy terms. My Washington registered patent Attorney, a former patent office examiner represents you and prosecutes your case. Patent search with copies $6.00 Invention record Free. Charles R. Morton, Patent Broker, Established 1919, Dept. 61, 11 West 42nd Street, New York.

"HOW To Market Your Own Product" Step by step procedure from idea to orders. Get free publicity—avoid costly mistakes. Mail $1.00 today to: Standard, 340-S Verdugo Road, Los Angeles, 41.

MONEY from inventions without big expense! Booklet $1.00, or information free. Parry Enterprises, 1503B Oxford, Berkeley, Calif.

" 'INVENTORS' Tool' is this book. For ideas and guidance, just take a look." Free introduction. Write: Box 106, G.A.C., St. Peter, Minn.

INVENTORS: You save up to 300% when dealing with your patent searcher direct. Complete search with patent copies $6.00. Reports mailed in 5 days. Invention protection forms free. Write Raymond L. Smith, Patent Searcher, 703-S Albee Bldg., Washington 5, D. C.

INVENTIONS Wanted—Patented, unpatented. Cash waiting! Financial assistance, those forming company. Suite 665-SA, 120 La Salle, Chicago 3.

"SUCCESS Plan of Inventing, Patenting, and Financing." $1.00 postpaid. Includes written expert consultation to purchasers. Order from Ivan Swanson, 3046D MacArthur, Oakland, California.

75 INVENTIONS WANTED

INVENTIONS Promoted, Patented or Unpatented. Write Adam Fisher Company, 183-A Enright, St. Louis, Mo.

WANTED: Practical inventions suitable for sale through 5c-$1.00 stores, drugstores, cigar stores; also sportsmen's items of all kinds. Write Matt, 1412-S Great Northern Building, Chicago 4.

INVENTORS: Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information, free. Institute of American Inventors, Dept. 30C, 1926 Eye St., N.W., Washington 6, D. C.

HAVE capital for manufacture and distribution practical inventions. M. Garten, 1122 Market Street, San Francisco 2, Calif.

ATTENTION Inventors! List your patented, patent pending, unpatented invention with me for immediate action. Hundreds of manufacturers have requested my assistance in locating marketable new inventions. Leslie Buford Stratton, Chicago Stock Exchange Building, 120 South La Salle Street, Chicago 3, Ill.

INVENTORS! Have you good patentable ideas? Write Patent Agent Metzleer, 11 West 42nd, New York.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

PATENTED, unpatented inventions wanted. We have tremendous lists of manufacturers who may pay cash, royalties. Descriptive booklet free. National Invention Service, 1404-D Mitchell Street, Oakland 1, Calif.

WANTED: Practical Inventions by Manufacturers, Patented or Unpatented. John D & Son, Dept. PS-6, Box 3213, 285 Howard Ave., Bridgeport 5, Conn.

INVENTIONS Wanted, Patented or Pending. Inventors Exchange, Dept. D, Hartford 1, Connecticut.

WANTED: Patented wood, metal tools, machinery, for royalty manufacture. A. Lemay, P. O. Box 635, Manchester, N. H.

99 PATENTS

INVENTORS: Test the commercial value of your patented or unpatented inventions, quickly and inexpensively. Write for free information. Institute of American Inventors, Dept. 30-B, 1926 Eye St., N. W., Washington 6, D. C.

100 PATENTS FOR SALE

PROTRACTOR:—patent pending; revolutionary, inexpensive, practical. For architects, machinists, carpenters, students. Cash, royalty. Emry G. Swan, 10 Cedar Street, Worcester 2, Mass.

82 MANUFACTURING

MODELS, small lot manufacturing, metals, plastics, etc. Millburn, Burlington, Kentucky.

MANUFACTURE Paints, your garage a factory free information. Industrial Chemist, 1826 60th, Kenosha, Wisconsin.

A BRAND new patentee's service. Write for information. J and M Company, Burlington 2, Kentucky.

87 MODELS, MODEL SUPPLIES

MOST complete Illustrated Catalog—"O-HO OO" Model Railroad Parts ever published. Send 5c for mailing. Selly, 1377 Gates Ave., Dept. 836, Brooklyn, N. Y.

SHIP Model and yacht supplies, complete large 64 page catalogue, 30c. Wm. Wild, 510 E. 11th St., New York City.

MODEL Ship Builders! Are you looking for authentic, precision ship models? Send for richly illustrated fully descriptive catalogue in full color of famous ships of all kinds. Only 10c. Halesite Yacht Service Inc., Dept. C-28, Halesite, Long Island, N. Y.

SHIP and Yacht model fittings; blueprints. Send 25c for illustrated catalog No. 20—Listing hundreds of items. A. J. Fisher, 1002-2 Etowah Ave., Royal Oak, Mich.

BUILD Model Ships, Railroads, Catalog 10c. Ideal, 21 West 18th Street, New York 11, N. Y.

RAILWAY models, complete line. Combined HO and O gauge, catalogue, 35c. Walthers, 269 Erie, Milwaukee 2, Wisc.

MOTORS — Kits (Aeroplanes, Racing Cars, Boats, Model R.R.)—Tools—Everything for the Hobbyist. Catalog 15c. Westchester Hobbies, Inc., 257 Mamaroneck Ave., White Plains, N. Y.

SCALE ship model kits and fittings of fine details. Price list 10c. Model Shipways, 476 Main St., Ft. Lee, N. J.

BIG illustrated Model engine catalog 10c. Active Products & Supply Co., 53 W. Jackson, Chicago 4.

STEAM boiler for model engines, withstands 500 lb. pressure. Complete with pressure gauge and all fittings. Uses one or two Sterno Cans for fuel. Postpaid $22.50. Ross, B68 West Broadway, New York, N.Y.

AMAZING midget ignition coil for gas model engines weighs only 2/3 ounce! Write for particulars. Electric Miniatures, 1607 S. Western, Los Angeles 6, Calif.

"MODEL Rail News," illustrated, for Lionel, Gilbert and all scale railroaders. "Car Lettering and Painting Guide" and sample copy, only 30c. Train Shop, 112-S Broad, Providence 3, R. I.

POWER Models—steam and gasoline engines. Steam traction engine, metals, tools. Catalog 35c. Charles Cole, Ventura, California.

SPEEDY 1" Motor, runs atop flashlight cell! Parts, instructions, 35c. Fonskov, 655-E Amboy, Perth Amboy, N. J.

BRASS Gears and model supplies for the inventors. Send 10c for catalog. Pierce Model Works, Tinley Park, Ill.

BALSA Wood Generous Supply $1.00 Price List Free. Sanlader, Manitowoc, Wis.

ILLUSTRATED Railroad Catalog O and HO 25c. Refund Coupon Attached. Lionel and American Flyer monthly lists upon request. Tri-Lor Hobbyist, State and Reed Roads, N. Dartmouth, Mass.

MODEL engines—steam and gasoline. World's most fascinating hobby. Build them yourself in your own shop, using your own tools. Send ten cents for illustrated catalog listing world's largest selection of miniature engine castings and drawings. McAded Models, 1313 So. Talman Ave., Chicago 8, Ill.

87A MOLDS AND MOLDING MATERIALS

RED Seal Moulding Compound. DuPont Latex Base! Guaranteed! Made by Experienced Latex compounders. Free Instructions and literature sent upon request. Red Seal Rubber Co., 116 Nassau St., New York 7, N. Y.

LIQUID Rubber for making flexible molds. Literature and Sample free. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

PLASTERCRAFT supplies. Molds, liquid rubber, plaster. Instructions free. Jayhawk Plasters, Blue Rapids, Kans.

LIQUID rubber, molds, models four colored plastic paint that Glows. And complete course in statuary art casting. Dollar brings you sample mold of bear. Robert Fitzpatrick, 15825 Wormer Ave., Detroit 23, Mich.

71 HOME CRAFTSMEN

LEATHERCRAFTERS! Send for free catalog listing leathers, tools, supplies. Kit Kraft, 1607 South Western, Los Angeles 6, California.

KOSTO Plexikit #1, send 25c for sample project and complete details. Kosto, Washington 7, D. C.

BOOKS: How to make "Rag Bag Toys" $1.00—"Action Toys" $1.00—"Coping Saw Work" 60c. Northern Supply Co., Sheboygan, Wisc.

FIRST Time offered. Full size Wall & Corner shelves. 5 Beauties $1.50. Beaver Patterns, Box 96, Clinton, Mass.

LEATHERWORKER'S Bible. Every leatherworker should own this completely illustrated catalogue combined with valuable instructions and information. Largest in this field. Actual leather samples. $1.00 postpaid. Satisfaction guaranteed. Artcraft Leather of California, 271D Twelfth Street, Oakland 7, California.

JEWELRY made in your own home, economically. We supply findings, imitation gems, small Lucite and Plexiglas squares, chemicals, ideas. Send for the Big illustrated Craftsmaster's Catalog. Only 25c (Refunded On First Order) Pittshire Plastics, Box 90, Pittsfield 4, Mass.

LEATHER Designs. Fifty belts, $1.00, Twenty billfolds, $1.00, Ten Handbags, $1.00. Lampkin Artcrafts, Box 641-S, Culver City, Calif.

LEATHER Designs on plastic eliminate tracing. Introductory offer $1.00, Sample 10c. Lampkin Artcrafts, Box 641-S, Culver City, Calif.

MAKE Beautiful cameo sea shell brooch, earrings. Complete Kit $1. Instruction booklet 35c. Wholesale Supplies. Shelart, 3027½ 6th St., South, St. Petersburg, Fla.

LEARN To make Sea Shell Jewelry, pins, earrings, hair ornaments, novelties. Book of Instructions and Designs free with $2.00 and $5.00 Kits. Postpaid. Catalogue 10c. Herbert Diamond Company, Box 4619, Miami 31, Florida.

MANUFACTURERS, any article, two 25c: Fifteen $1.00. Research, Box 90, Pittsfield 4, Mass.

WHITTLERS. Carve six amusing animals. Plans, redicut pine blanks. $1.75. Free list expert kits. Wm. Rackham, 7122 Ingleside, Chicago 19, Ill.

WHITTLERS, easy to finish! Basswood animal Forms—in the Round (not jigsawed Patterns). Skunk .50, Squirrel .50, Beaver .50. Cash with Order. Fieldcraft, Inc., 755 Boylston Street, Boston 16, Mass.

EXPERIMENTERS! Interested in Electrical, Mechanical devices from war surplus? List Free. F. Siefke, Box 18, Station E, Buffalo, N. Y.

PLASTIC Chair Cane Webbing Flats, Ovals. Samples Dime. Fogarty Caner, Troy, N. Y.

LEATHERCRAFT Sensational Photo-Pattern Complete Set 45 Projects $3.50. Supplies. Kruces Kreative Kraft, Box 42, Las Cruces, New Mexico.

WHITTLER'S Kit—10 redi-cut pine blanks, X-acto knife, instructions. $2.00. Catalog other materials. 10c. "Old" Whittler, 1402 Charles, LaCrosse, Wisconsin.

SPECIAL 77 full sized Patterns. Lawn Ornaments, Toys and Novelties $1.00. Modern Woodcraft, Saginaw, Michigan.

LEARN Shellcraft, Shells, instructions, everything needed for 6 colorful sets Shell Jewelry in Beginners Kit $3.40 p.p. Complete supply findings available. W. F. Whittaker, Shell Jewelry & Supplies, Box 988, Punta Gorda, Florida.

SWISS Musical movements. Easily installed. Popular, classical, waltz, selections, $3.98 Postpaid if cash with order. Pinto Brothers, Dept. P.S., 13 North Henry St., Brooklyn 22, N. Y.

KNOCKDOWN Cedar Chest Lumber Veneers Free Price List. Giles-Kendall, Box 435, Huntsville, Alabama.

23 BUILD IT YOURSELF

BUILD your own Log Cabin home. Richly illustrated book packed with plans, Ideas, Pictures, Instructions. Send $2 to Ostego Log Homes, Gaylord 2, Mich.

HOT Water Free—from Sunlight. System efficient any locality year 'round. Standard materials—easily built—low cost. Facts Free. Solar Water Co., Box 175, Dept. K, Coral Gables, Fla.

MAKE Popular novelties, statues, at home—3c to 15c each. Sell at big profit. Everything Supplied. Write So-Lo Works, Dept. U-6014, Loveland, Ohio.

BUILD concrete block machine. 2 blocks per minute. Build concrete mixer. Easy, inexpensive. Details free. Horne, 206 West Wilder, Tampa, Florida.

BUILD your own dishwasher that washes, dries dishes sparkling clean. Easy, inexpensive for anyone with simple tools, complete plans $1.00. Inventor, Box 355-A, Lessburg, Fla.

SWIMMING Pool! Beautiful, inexpensive. Engineered, tested Plans, $2. Northridge Tractor Co., Northridge, California.

BUILD your own home, scaled drawings and plans like blueprints for 5 homes $1.00. A. Piccirille, Box 549, Sharpsville, Pennsylvania.

BUILD Kiddies Masonry Wading Pool for $8.00. 8' Diameter. Plans 50c. Phelan, 934 W. Somerset St., Phila. 33, Penna.

"BUILD Your House as a Hobby." Save 50%. No rent. No Mortgage. 24 page booklet: drawings, instructions on how to build. $1.00. H. C. Lightfoot, Civil Engineer, Richboro, Bucks County, Penna.

SENSATIONAL New Ride. Kids Love it. Easy to build. Prints $2.00. Teeterswing Co., Box 363, Royal Oak, Mich.

BUILD real heavy duty machines using our production tested plans. 30" Bandsaw, 12" Lathe, Dowel Machine, Portable sawmill, Planer, Concrete Block Machines, Mixers, 70 machines for shop, farm, home. Catalog—Handbook Free. Nichols Equipment Co., Dept. PS, Purviss, Miss.

BUILD your own home. Working blue prints at fraction of usual cost. Comply with F.H.A. and G.I. regulations. Send $1.00 for book showing 71 distinctive, economical small homes. Griffin-Patterson Company, Box 1190A, Glendale, California.

GARDEN Chair. Full size jig saw pattern postpaid 10c. Masterprint Company, White Building, Buffalo 2, New York.

Copyrighted material

139 WATCH REPAIRING

YES, we sell staking tools with adaptor for the use of inverted punches. (Patent Pending.) With 40 punches complete $52.95. With 60 punches $75.50. Adaptor alone $7.95. Sole distributors. F. S. Horological Co., Box 43, Planetarium Station, New York 24, N. Y.

WATCH and Clock Repairing—complete practical course in modern horology. 66 illustrated self-instruction lessons. Just out! Low price. Fascinating 100-page illustrated catalog Free! Write—Nelson Company, Dept. 3-01, Chicago 5.

WATCH & Clockmakers Handbook-Britten $5.79. Most Complete On The Subject. Free Catalog. Engineers' Book Service. 19 W. 44th St., New York City 18.

FINE watch, chronometer watch, clock and electric clock repairing. 10 Day Service for Popular Models. The Little Jeweler, Box 17, East Dedham, Mass., A. R. Ciriello, Watchmaker.

WATCH and clock repairing increasing, complete home study course with drawings and pictures. Information free. Houston Chronometer and Watch Co., P.O. Box 1140B Houston 12, Texas.

95 OLD GOLD, WATCHES, ETC.

CASH for Old, Broken Jewelry, Highest prices paid immediately. Mail gold teeth, watches, rings, silverware, diamonds, spectacles. Satisfaction guaranteed. Information free. Rose Smelting Co., 29-Y East Madison, Chicago.

GOLD $35.00 Ounce—Mail old gold teeth, diamonds, jewelry, watches—receive cash by return mail. Satisfaction guaranteed. Free information. Dr. Weisberg's Gold Refining Company, 1500-B Hennepin, Minneapolis, Minn.

WATCHES—Broken or Usable: All kinds. Highest prices paid for jewelry, rings, spectacles, gold teeth, diamonds, sterling silver, etc. Cash mailed promptly. Write for free shipping container. Lowe's, Holland Building, St. Louis, Mo.

HIGHEST cash paid for old gold teeth, diamonds, jewelry, watches, rings. Satisfaction guaranteed. Information Free. Ferm Jewelry Co., 170 Broadway, New York 7, N. Y.

20 WATCH Movements broken for Student Practice Work. $10.00. 3 pounds Broken Costume Jewelry. $8.00. 1000 Costume Jewelry Stones. $3.50. Lowe's, Holland Building, Dept. PS 611, St. Louis 1, Mo.

76 JEWELRY

CERAMIC Jewelry Supplies, Bar Pins, ear screws, for ceramic and woodworkers, also, glass and sea shell assemblers. Free catalog. Philadelphia Badge Co., 1007 Filbert St., Philadelphia, Pa. Dept. E-1.

MAKE your own jewelry! Findings in metal and plastics: earwires, pinbacks, cameos, stones, beads, clasps, sprays, combs, hairbars, plastic and metal chains. Hobby Art Corp., Dept. 6, P.O.B. 276, New York 18, N. Y.

MANUFACTURE costume jewelry at home for profit, hobby, therapy. Free wholesale supply catalogue. Instructions. Florida Supply House, Bradenton, Florida.

"MAKE Shell Jewelry. Free book instructions and designs with each Five Dollar Kit. Handsome profits easy to learn, write today. Reffkin Shell Novelty Works, Staugustine, Florida."

LOWEST price ever. Genuine stretch bands for Men's watches. Yellow, Pink, White. Send money order for $3.65 to Friedman Jewelry Co., 106 N. 7th, St. Louis 1, Mo.

JEWELRY Findings, Lowest Prices. George Sassen, 154 Nassau Street, New York 7.

HEMATITE 16x12mm. Cameoes standard sizes in all types of genuine stones. R. L. Emmerich, 2916 No. Oakland Avenue, Milwaukee 11, Wisc.

SHELL Jewelry—Easy to make—Easy to Sell—Highly profitable—Lots of fun. Beginners Kit, containing all materials and illustrated instructions for making six colorful pin and earring sets, postpaid only $3. Free Monthly designs, free price list of shellcraft supplies. Don-Dee Shellcraft Industries, P. O. Box 1183C, Orlando, Fla.

SEND dime for Cameo Samples included Rhinestone and Findings Pricelist. Perry Metros, 34-37 100 St., Corona, N. Y.

132 TOBACCO & PIPES

UNPOLISHED seconds of $5.00 pipes 75c postpaid. Literature free. Carvapipe, 2829-x Dixie, Hamilton, Ohio.

CIGARETTES—all popular brands, $1.45 per carton, postpaid. Three cartons, minimum. Send check or money order. No limit. Durham's Mail Order Co., North Branch, N. J.

A new way to use tobacco clean, invisible and economical, smoke fewer cigarettes, complete instructions $1.00. J. P. Lesley, P. O. Box 65, Easley, S. C.

CIGARS—Pipes—Tobaccos, bargains. Box 50 Coronas $2.95 up. Briar pipes "Seconds" regular $5.00, only $1.79. High grade Tobacco mixture $1.10 8 oz. Send check with order. Free catalog. Zibar Company, Roselle, N. J.

86 MISCELLANEOUS

BOOKFINDERS! (Scarce, out-of-print unusual books.) Quickly supplied. Send wants. Clifton, Box 1377 PSM, Beverly Hills, Calif

GOOD "Used" self-instruction educational books on all subjects bought, sold, rented, exchanged. Satisfaction guaranteed. Complete information and 100-page illustrated bargain catalog Free! Write—Nelson Company, Chicago 5.

UNUSUAL Novelties, samples 10c. Modern Products, P.O. Box 2, New York 2.

GET Lots Of Mail: Name Listed Three Directories 25c. Harvey Teeple, Decatur, Ind.

"HOW To Break And Train Horses"—A book every farmer and horseman should have. It is free; no obligation. Simply address Beery School of Horsemanship, Dept. 585-C, Pleasant Hill, Ohio.

MECHANICAL Drawing Instruments—Veeco, 4 Piece, compact, precision set, brand new in lined case, value $12.50, Special $7.25. Hull Automobile Compass, for accurate road direction, brand new $2.50. Prisms for 6 x 30 or 8 x 30 Binoculars brand new $1.50 each. Offset prisms to be attached to 7 x 50 B. & L. Binoculars gives double the field of the ordinary 7 x 50 Binocular. Cost $98.00. Special $25.00. Green Sunshades for Binoculars size 6 x 30 and 7 x 50 snap on type, value $7.50, Special $1.25 per pair. Forward money order. No C.O.D. shipments. Public Sport Shops, 13 S. 16th St., Philadelphia, Pa.

ART Photos of Beautiful Hollywood models 4 x 5—8 for $1.00, 32—$3.50 Prepaid. Visual Slides, 1269 Broadway, New York 1.

AT Home—Your own manufacturing business; making popular $1.00 novelties. Cost you 3c to 15c. Everything supplied. Write So-Lo Works, Dept. U-6012, Loveland, Ohio.

YES, Men's shoes in Sizes 11½ to 16. Widths AA to EEE. Finest Quality, moderate price. Free Circulars. Write Kingsize 135, Brockton, Mass.

SENSATIONAL! New! Home Necessity. Multipurpose. Amazing convenience. Only $2.95. Free information. Cox Enterprises, 601 S. Vermont, Los Angeles 5.

MAN! 6 Daring pocket-size "Art-Photos" $1.00! Satisfaction or refund! Box 699-J, Westfield, New Jersey.

MODERN Tool has 100 farm uses. Flame thrower kills weeds quickly, economically. Valuable literature free. Sine Equipment, 16S, Quakertown, Penna.

VETERANS. Disabled. Shut-ins. Learn! Earn! Temple of Healing, Columbia City, Indiana.

"HOLIDAY Greeting cards designed especially for you. Send Photo. $4.00 per doz. Bel-Monde Cards, Box 684, Hermiston, Ore."

UNUSUAL Photo Novelties. Catalog and useful Souvenir. 25c coin. Photo Novelty Co., Box 238, Trinidad, Colo.

THE Lord's Coming! Get Free Proofs. Time is short! International Evangelism, Box 263, Duluth, Minnesota.

PSYCHO-ANALYZE yourself! Tests! Explanations! Solutions!—$2.00. Satisfaction or refund! Box #699-1B, Westfield, N. J.

GLAMOR Girls. Real Photographs. Captivating Poses. 10 for $1.00. Wilkins, 417 Hill Street, London, Canada.

LIKE the proverbial snowball, Colorado's Fabulous Oil Boom gathers momentum. Big Pay offs readying. Would you like shot at $1,000 to $20,000 on investment of $140. Dyer, 1835 Champa, Denver, Colo.

PANNING Gold. Learn How. Instructions. In Free Illustrated Booklet-Catalogue Mining Books, Supplies. Old Prospector, A-82, Dutch Flat, California.

ART Photos! Spicy; sample .50, 3 for $1.00, Sandige, Route 1, Box 995, Phoenix, Arizona.

VERMONT maple sugar postpaid in $1.00, $2.00 and $5.00 lots. Eulalia Turner, Poultney, Vermont.

MEDICAL Laboratory Technicians in great demand. We train you in your spare time, in your own home. You can practice while studying. Write for free catalogue. Imperial Technical Institute, Box 973-S, Austin, Texas.

FREE—Samples, Magazines, Catalogs, Literature, Moneymaking Opportunities! Receive lots of Mail from Everywhere! Mails Galore! Your Name Listed in over 15,000 "Surefire" Mailing Directories, $1.00. Smaller, More Select listing—same price. Here's your chance to receive plenty of interesting mail! Act Now! Stanford, 6220-N 16th St., Philadelphia 41, Penna.

FREE literature how to locate buried treasure and minerals. Fisher Laboratory, Inc., Palo Alto, Calif.

COMBINATION mimeographed letterhead and letter, 100—$1.35. Samples free. Martin Mimeo, 3212 Harper, St. Louis 7, Mo.

UNPAINTED wall plaques. Free list. Franks, 744 Laurel St., St. Paul, Minn.

HYPNOTIZE anyone! Get the most perfect, easily learned, modern scientific course of "Genuine Hypnotism" in the world. Fully illustrated. Only $1.00. Money back guarantee. Fowler, Box 1284, Boston 4, Massachusetts.

MEXICAN Law General Practice Attorney. 1203 Arizona St., El Paso, Texas.

MAKE Your Own Plastoplate printing cuts. Simple, easy process. Plastoservice, Argyle (2) Wisconsin.

138 WANTED MISCELLANEOUS

WANTED: Anything in unusual Bulbs, Plants or Seeds. Also any salable novelties, for Florist or Gardener, also any gadgets for the Farm or Garden. Will act as Manufacturers Agent or will buy outright. Jo-Bee Company, 1023 Fox Bldg., Detroit 1, Mich.

57 FOR THE HOME

STOP wasting money through heat loss. Our plans tell how. Free details. C. Claber Co., Box 491, Grandville, Mich.

INSULATE your own home "yourself". Complete Plans — Illustrations — Instructions $1.00. Money-back guarantee. Details Free. Fuel Saving Service, P. O. Box 741-PS, Canton, Ohio.

101 PERSONAL

I Don't Care What Laxative You Now use for constipation. Test genuine Old Mohawk Herb Laxative and you'll never use anything else again. It works. Generous sample 10c. Write today. A. J. Shutt, Dept. L-5, 506½ S. 15th St., New Castle, Ind.

Copyrighted material

POPULAR SCIENCE OPPORTUNITIES

PSORIASIS Sufferers: Has everything failed to bring even temporary relief from scales, lesions and itching? Then write today for Free important information. You needn't invest one cent! Pixacol Company, Dept. S, Box 3583, Cleveland, Ohio.

MATRIMONIAL—Sweetheart Magazine, 50c. 6 mos. $1.00. Yr. $2.00. Barwood, 2037-E 42nd, Astoria, N. Y.

RUPTURED? Positive comfort, no understraps, no steel, no elastic. Write Smith Manufacturing Co., Preston, Ontario.

HAIR Falling? Dandruff? Write Trichologist, 139 Lewis Street, Phillipsburg, N. J.

STUTTER? Stammer? Literature sent free. Frank Teurfs, 25 E. Jackson, Chicago, Illinois.

SPICY Adult Photographs! Six—$1.00! Satisfaction or refund! Box 699-G, Westfield, New Jersey.

BUY nationally advertised vitamins, toothpaste, shampoos, etc., at great savings. Catalog. Bay Pharmacal Co., 2362 E. 23 St., Brooklyn 29, N. Y.

SUGAR a problem? Try sweetolene substitute equal to 16 lbs. $1.00 postpaid. No C.O.D. A. B. Warder, Whitevale, Ontario.

HOW Would You Like To Power Charm? India's mystic secret will do the trick. Send 50c today and start instantly. Irving Closson, 118 Maple Street, Waterbury, Conn.

STAMMER? Let me help you. Details free. Sauers, Box 139-G Mars, Penna.

FREE Healing Cloth and Gospel Tracts. Mrs. T. C. Pence, Route 4, New Castle, Penna.

HAPPINESS Ahead In 1947! Single persons write today (enclose return postage) for free Illustrated, descriptive booklet by Movieland Guidance Counselor. No obligation. Troy LeRoy, 6417 Homewood Ave., Dept. PS, Hollywood 28, California.

BORROW By Mail. Loans $50.00 to $300.00 to employed men and women. Easy, quick. Completely private, confidential. No endorsers. Repay in convenient monthly payments. Details Free in plain envelope. Write State Finance Company, 222 Davidson Bldg., Dept. N-15, Sioux City 3, Iowa.

INFORMATION for single people by Human Relations Consultant. University Graduate. Dr. B. Long. Box 375, Los Angeles 53, Calif.

NATIONS in Prophecy. 25c. Bulletin. Box 87, Station H, New York 25.

YOU Can Find happiness and good fortune and have friends everywhere through My Magazine of "Friendship" you're really missing plenty, if you do not send stamps to cover cost for sample copy—you'll never regret it. Address, Jack Wilcox, Box 384, Eastport, New York.

BUY Vitamins Direct. Amazing Savings. Money Back Guarantee. Our 9th year! Postcard. Matoska Products, White Bear Lake, Minn.

SAN FRANCISCO—Reno, Nevada, 3 souvenir postcards 25c. You address, write message, we remail. Letters remailed 25c each. Free particulars. Ira Smith, Box 4685, San Francisco.

ATHLETE'S Foot. Sporeen is Guaranteed. Write Sporeen, 726 Summit, Toledo 4, Ohio.

HOW You Can Find Out! Information discreetly developed, any matter, person, problem anywhere. Personal-business assignments, representations, undertaken. Nationwide. Officially Licensed and Bonded Service established 1922. Reasonable. All inquiries confidential. William Herman, 170 Broadway, N. Y.

FIVE Philadelphia postcards; You address return, we remail; 25c. Kaye's, Box 1301, Philadelphia 5, Penna.

PRETEND visiting Atlantic City. Postcard views 25c each write message address return to me for mailing. Souvenirs $1.00. Delicious Atlantic City Salt Water Taffy $1.25. B. W. Stamp Company, 280 South Congress Ave., Atlantic City, N. J.

PSYCHOCLINIC Service—Counsel, family relations, analysis. $1. min. Ralph E. Rowlett, 2601 Dickson St., St. Louis 6, Mo.

"LARGE 11"x14" pen and ink caricature drawn from your photograph. State hobby or pastime. Send $1.00 plus photo to: Charles Sutton, 103 Johnson St., Sayre, Penna."

NUDIST Publications—Illustrated. Information, stamp. Royal, Box 531-A, Waterbury, Conn.

1 ADVICE

PSYCHO-ANALYZE Yourself! Tests! Explanations! Solutions!—$2.00. Satisfaction or refund! Box #699-1a, Westfield, N. J.

"VITASCIENCE"—The Science of life. Drugless healing through the spoken word. Inexpensive. Details free. Cedric S. Moore, 1313 South Union, Kokomo, Indiana.

2 ADVERTISING

ADVERTISERS: Mail order ad covering United States—2,000,000 circulation—$21.00 inch. Classified ad, 24 words, 20 metropolitan Sunday newspapers—$25.00. Magazine, newspaper, mailing-list rate-book, adwriting assistance—free. Chicago Advertising Agency, 20-PS West Jackson, Chicago 4.

ADVERTISE: 24 words, 40 Newspapers $3.50. Lists Free. Advertising Bureau, 229-P Dixson Blvd., Uniontown, Penna.

24 WORDS in 64 Weeklies $4.96. J. Darnell, 730 Hays, Jackson, Tenn.

EXPERIENCED Advertising Specialty Representatives. Thermometers, Yardsticks, Calendars, Plastics, Leathers, Metals. Commission. Bonus to 50%. Complete resume with references essential. Eric Howlett, Huntington, New York.

INCH Display Advertisement Mail-order World, year $24. Wood's Popular Services, Atlantic City, New Jersey.

ADVERTISERS: We specialize in a highly personalized service to mail order accounts, large and small. Complete staff expert artists, copywriters, etc. We are a legitimate advertising agency that can produce results for you. No extra costs to deal with us. Legitimate businesses solicited. Larson Advertising, Dept. PS, 315 N. 7th St., St. Louis, Mo.

66 HANDWRITING ANALYSIS

ANALYZE Handwriting for Profit! Complete outfit $1.00. Graphologists, 2404N15, Philadelphia.

CERTIFIED Grapho-Analyst will analyze your script. State age, sex and enclose $2.00. Otty Kling, 2240 Selma Ave., Youngstown 4, Ohio.

45 DRAFTING INSTRUMENTS

SAVE on drafting materials. Free catalog. Draftsmen's Supply Co., 32 North Wells, Chicago 6.

MAKE your Elliptical Templates for material cost. Complete information write. A. W. Arnemann, 1728 Ainislie, Chicago 40.

DRAFTSMAN'S ruling pens sharpened 75c. Howard Odiorne, 27 North St., Fairhaven, Mass.

129 TATTOOING SUPPLIES

TATTOOING Outfits—engraving Outfits. Circulars Free. Write, Zeis, 728 Lesley, Rockford, Illinois.

119 SCIENTIFIC EQUIPMENT

NEUROTIC suffering, make apparatus cheaply printed forms $1.10. Artisan Psychiatrist, 281 E.M., Watertown, N. Y.

27A CANDY MAKING

MEN—Women—"Everybody Likes Candy". Learn to manufacture professionally at home. (Our 36th Year). Ragsdale Candies, East Orange, N. J.

27 CAMPING

BOY Scouts—Campers—U. S. Army Surplus used equipment pup tents $2.95, canteens with cover and cup $1.00. Mess-Kits 75c. Packs $1.00. Complete set $5.00 includes cartridge belt, sleeping bags. $5.95. Samet Salvage Co., High Point, N. C.

FLASH light. "Cheslite". Box type, suspended on chest with strap around neck. Merchant Marine surplus, $1.10. Postpaid. Green Light Co., Bethlehem, Penna.

81 A MAGNETS

SPECIAL. 12 Alnico Magnets plus 100 experiments. $3.00. 100 experiments only. 25c. War surplus, extra powerful 1" Disc Alnicov magnets—fascinating; pair $2.00. G. E. Midget precision switches. 110V. 10A—2 circuit; each $1.00; six $5.00. Eljay, Box 891, Newark 1, N. J.

PERFORM astounding stunts with Alnico. Defy gravity. Mystify your friends. Two bar magnets. (4 oz.). instructions. $.60 Postpaid. Ross, B68 West Broadway, New York, N. Y.

ALNICO Magnet—Lifts Ten Pounds! $1.00. Five smaller magnets—$1.00. Ronald Eyrich, Box 849, Milwaukee 1.

134 TREASURE FINDERS

SEEK Buried Treasure. Methods, mysteries, devices explained. Circulars free. Century Press, Box 151-D, Glen Ellyn, Ill.

MT-SCOPE Metal Locator fully guaranteed and unsurpassed in efficiency. Time payment plan, trade-in and accessories. Free literature. Fisher Research Laboratory, Inc., Palo Alto, Calif.

METAL Detectors. The Very Latest Circuit. Free Literature. Hedden Metal Detectors, 538 North Homewood Avenue, Pittsburgh 8, Penna.

21 BOOK MATCHES

YOUR own personalized Matches. 50 Metallic covers each with your name $1.10. Morey, 87-4 Somerset, Springfield 8, Mass.

42 DETECTIVES

DETECTIVE Training. Phillips Secret Service, 1917C. N. Kenneth, Chicago 39, Ill.

BE A Detective—Send for price-list of self-instructional courses at reduced prices. Perkins Publications, 300-C Brandeis Theatre Bldg., Omaha, Nebraska.

DETECTIVES—Work home—Travel. Experience unnecessary. Write Wagoner P-125 West 86th, N. Y., N. Y.

DETECTIVE training. Department store work, shoplifters, etc. Also general detective procedure. Thirty years diversified detective experience. Free details. Write Shewbridge System, 216 Valdez Avenue, San Francisco 12, Calif.

89 MONUMENTS

WRITE For Direct Prices $14.00 Up. Freight Paid. Guaranteed. Free Catalog. Granite-Marble Factory, A49, Oneco, Fla.

74 INFORMATION

INFORMATION Locating articles and products (Wholesale) etc. Mention Requirements. National, 3537A South Hoyne, Chicago 9.

93 NAME LISTS

MAILING Lists, certified, productive, inexpensive. $5.00 1000. Homeworkers, agents, buyers, etc. Write Dixie Service, King, N.C.

WHOLESALE anything imaginable. New guaranteed list 10c. Refundable. La Salle Novelties, Box 2188, Waterloo, Iowa.

500 WORKING Peoples names and addresses $2.00. A. Reeves, College Station, Box 184, New York City.

NEW Brides; Babies; 2c each. Information Free! Detroit Name Service, 514 Northwestern Station, Detroit 4, Michigan.

MILLIONS of names, state your needs. Q Service, 422 So. Dearborn, Chicago.

84 MILITARY INSIGNIA

COLLECT colorful Army Patches. Pictures. Price and sample patch only 10c. Insignia Mart, 703 Broadway, N. Y.

123 SOUVENIRS

FREE German War Relics with each purchase. Send 10c for price list of captured Foreign medals, daggers, uniforms and receive 4 German Ration Potato stamps, free. Hobbyguild, S35, West 32nd St., N. Y.

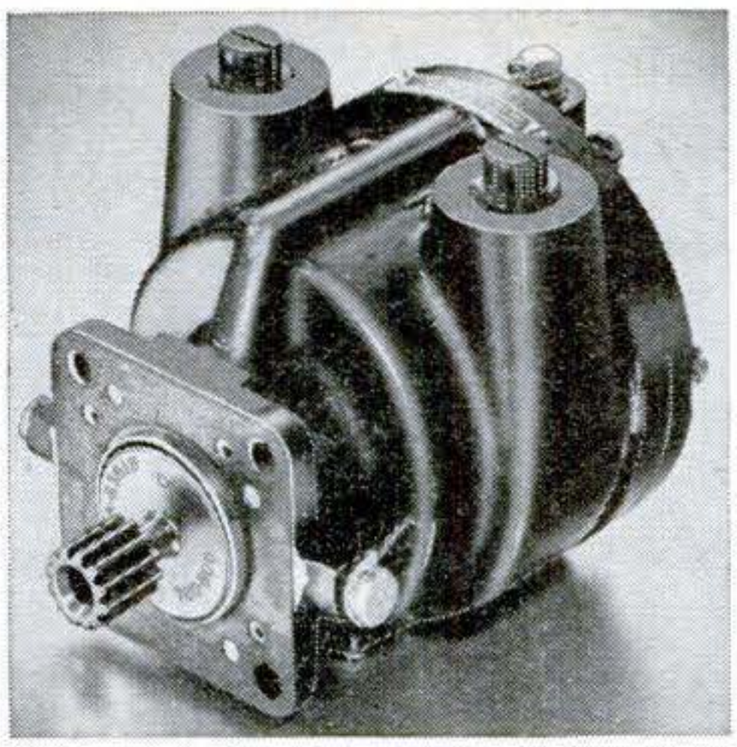
Copyrighted material

WAR SURPLUS BARGAIN SPECIAL

BRAND NEW!
VACUUM-AIR HYDRAULIC

FUEL PUMP

Original Cost $45.00
Now Only
$9.95
Postpaid in U.S.A.



WORTH MANY TIMES THIS LOW SALE PRICE

USE THEM FOR
OIL BURNERS
SPRAYING MACHINES
MILKING MACHINES
COMPRESSORS
VACUUM PUMPS
HYDRAULIC SYSTEMS
MANURE LOADERS
PRESSES, etc.

● Originally cost $45.00. Used by the Air Corps to drive bomber de-icer boots, gyroscopes, automatic pilots, etc. May be used as air or fluid pump—for pressure or vacuum. Standard 3/8 inch pipe thread with interchangeable ports. Will pump 7½ gal. SAE 30 oil per minute at 300 RPM. Builds air pressure of 30 lbs. per sq. in. at 1000 RPM. Vacuum will draw 26 inches of mercury at 1750 RPM. Develops up to 120 lbs. per sq. inch of hydraulic pressure, which in conjunction with a 3 inch hydraulic cylinder, will lift 840 lbs. minimum. Runs forward or reverse. Self aligning shaft. Die cast aluminum housing 6x4x4 inches. Has stainless alloy steel vanes and impeller. Made by Bendix Avia. Corp. Spline terminal for direct drive—readily replaced with a pulley. Recommend a ¼ H.P. or stronger electric motor as source of power. Rated capacity 1500 RPM with high overload factor. Special price for quantity users. Complete illustrated report and instruction booklet FREE with every pump. Send check or money order today. Postpaid in U.S.A.

$9.95

GROBAN SUPPLY CO. **1522 So. Michigan Avenue Dept. PS6 Chicago 5, Ill.**

NEW! MINIATURE DUST MASK

Wear when sanding, grinding, paint spraying, sweeping, dusting, furnace cleaning, etc. Handy as a pair of glasses. Just keep mouth closed and breathe through nose is all you do to operate. Protects against nuisance dusts, lint, coal, cement, grain dusts. HAY FEVER pollen! Weighs 1 oz. Has 9 sq. in. filter.

Order Today $1.00 POST PAID

JERRY BRYANT PRODUCTS
Dept. PS, 919 N. Michigan Ave., Chicago 11, Ill.

PRESTO! ANYONE CAN MASTER GLAZE

Car Owners! Meet Master Glaze—the sensationally different luster for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that "smears" over the surface.

MASTER GLAZE is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! NOTHING LIKE IT!

AGENTS
An unusual opportunity! Quick, flashy demonstrator. Big profits. Good territory. Write today!

FREE SAMPLE
Just send your name and address to
MASTER GLAZE CO., 7720-605 W. Harwood Ave., Milwaukee, Wis.

TELEVISION IN YOUR HOME NOW FOR ONLY $159.50 Complete

This easy-to-assemble kit plus a few hours time gives you a highest quality television set in operation . . . at only half the price you'd pay for the lowest priced set on the market!
Designed by television experts, this kit contains everything . . . dipole antenna, 7" picture tube, pre-tuned R.F. unit . . . even solder! Nothing extra to buy. All you need is a screw driver and soldering iron. Assembly instructions are non-technical and simple to follow. All complex units are pre-assembled.

EQUALS HIGH-PRICED SETS IN PERFORMANCE
Perfectly focused, clear picture even in brightly-lit room. Over 6,000 Transvision sets assembled by novices are in perfect operation today!
Each set has an unqualified guarantee. Order one now and see the ball games in the comfort of your living room!

BEACON TELEVISION, Inc.,
Distributors for Transvision Television Kits
143 East 49 St. New York 17, N. Y.

Beacon Television, Inc. **PS-6**
143 East 49 St., New York 17, N. Y.
Gentlemen: ☐ I'm interested in your easy-to-assemble Transvision Television Kit. Please send me more information.
☐ Please send me a Transvision Kit at once at $159.50. Enclosed is my check (or money order) for $25.00 as deposit. Ship it C.O.D., F.O.B. New York and I will pay balance on delivery.
Name.....
Street.....
City.....State.....

HEARING HAPPINESS
ENJOYED BY THOUSANDS

The activities of normal living are being enjoyed to the fullest by thousands of hard-of-hearing persons who wear our single-unit electronic hearing aids. Comfortable and inconspicuous, this tiny new hearing aid will amaze you. For complete information and FREE booklet, write VACOLITE, Dept. PS, 3003 N. Henderson St., DALLAS 6, TEXAS.

Copyrighted material

Genuine BLACK CALF OXFORDS

Expertly Made for the U.S. NAVY

by **FLORSHEIM • NUNN-BUSH STETSON** AND OTHER FAMOUS MAKERS

- First grade. First quality Calf Blucher
- Strong Goodyear welt construction
- Finest top grade black calfskin uppers
- Hardy, flexible leather soles
- Comfortable leather insole and lining

SMART SIMPLE LINES

THE SHOE EVERY MAN CAN WEAR.

Send check, cash, or money order at once. If C.O.D., send $1.00 deposit. Size ordered and quality of shoes GUARANTEED or purchase price refunded. Orders filled in order of receipt — so avoid disappointment. Order now!

RUSH This Money-Saving Coupon NOW

RAYLOU CO., INC., Dept. AC
450 Fourth Ave., New York 16, N. Y.

Please send me the following U. S. Navy Genuine Black Calf Oxfords. I enclose $5.90 plus 35c shipping charges for each pair.

.....Pairs .....size .....width
.....Pairs .....size .....width
.....Pairs .....size .....width

Name .....

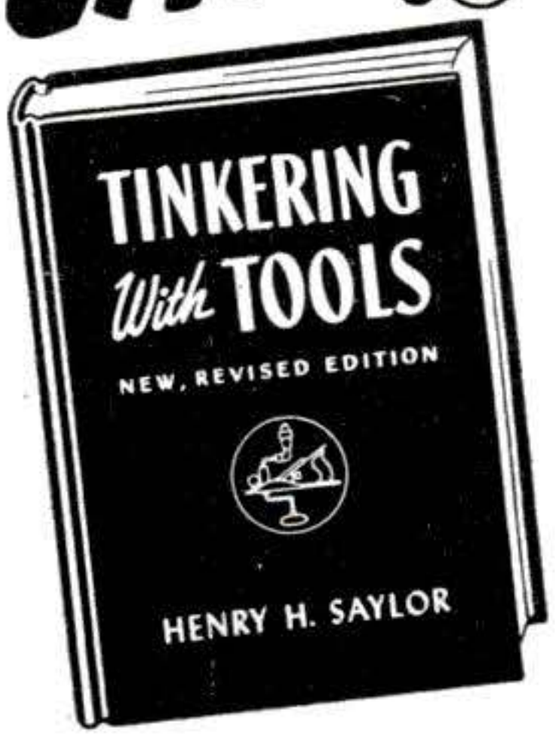
Address .....

City and Zone ..... *State* .....

☐ **Please send C.O.D. I enclose $1.00 deposit and will pay balance plus C.O.D. charges on delivery. Save C.O.D. fee. Send money with order.**

SAVE UP TO 50% BY DOING YOUR OWN HOME REPAIRS

NEW BOOK MAKES IT EASY! ONLY $1.49



You can save *up to 50%* on home repairs — and have lots of fun besides — if you follow the simple, easy-to-understand instructions in TINKERING WITH TOOLS!

Tells you everything you need to know to cut repair bills—how to refinish floors and furniture, how to repair electrical appliances, and plumbing fixtures, how to lay sidewalks, shingle roofs, plaster walls, renew sash cords and hundreds of other repairs and improvements around the house! Never before has so much valuable information been crammed into one big cloth-bound volume to sell for only $1.49! Books of similar size usually sell for $2.50 or more!

SEND NO MONEY NOW!

Just mail coupon below and pay postman only $1.49 plus mailing cost for this DeLuxe edition. If, after 7 days' examination, you wish to return book *for any reason,* we'll gladly refund every cent you paid.

MAIL COUPON TODAY!

POPULAR SCIENCE—Dept. P67
353 Fourth Avenue, New York, N. Y.

Send me the new 260-page cloth-bound book, TINKERING WITH TOOLS. I will pay postman only $1.49, plus postage, on delivery. If dissatisfied, I may return book within 7 days for full refund.

NAME.....

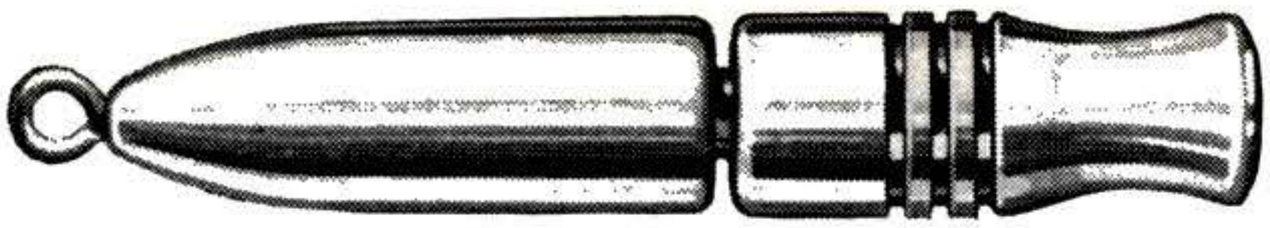
ADDRESS.....

CITY..... ..... ZONE ..... STATE.....

☐ If you remit now, we will pay postage. Same refund guarantee.

Copyrighted material

SANBORN SUPER-SONIC WHISTLE NO. 2



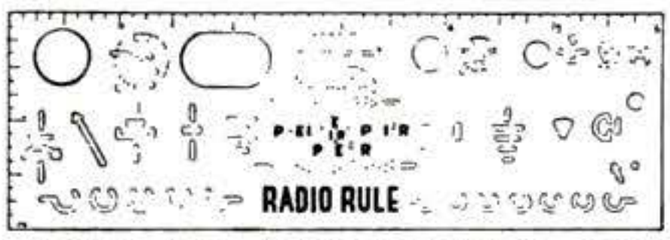
ACTUAL SIZE

$2.00

NEW POWERFUL SILENT TYPE WHISTLE designed for the silent calling of dogs. Horses and other animals also respond with little training. Whistle has been calibrated by physicists at one of the country's largest technical universities. Humans can feel and hear Super-Sonic vibrations for a very short distance. It is estimated that most dogs can hear this whistle for one mile. The high pitch vibrations are in excess of 10,000 kilocycles per second. It can also be adjusted to an audible frequency that can be heard by man or beast for one mile. A scientific precision made instrument of quality, turned from aluminum alloy.

SANBORN PRODUCTS CO. **P. O. BOX 132-G** **MENTOR, OHIO**

Get this New RADIO RULE!



Needed by all radio engineers, draftsmen and technicians. This accurate 6 inch symbol rule saves you time and money. Sent immediately upon receipt of $1.00.

ORDER YOURS TODAY

COLETTE PRODUCTS CO., 413 FOX BLDG. DETROIT 1, MICH.

BIG MONEY FOR YOU IN PLASTICS

SEND **10¢** Offer includes 2 books: New Fabrication Manual & Giant Catalog, listing the most complete stock of Plastic Materials, Accessories, Tools.

BERTON PLASTICS, INC.
19 W. 21st St., N. Y. 10, N. Y.

Wonders Through The MICROSCOPE

A new book which tells you all about MICROSCOPY. Turn an inexpensive microscope on hundreds of specimens within a stone's throw of your front door and you step off into a new world of wonders. Complete manual for amateurs. How to use equipment, secure and preserve specimens, take photomicrographs, etc. Numerous illustrations. Full cloth bound, $1.49.

POPULAR SCIENCE MONTHLY, Dept. 67, 353 4th Ave., New York 10, N. Y.

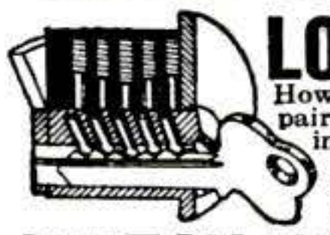
JEEP STATION WAGONS

Smart Maple—Oak Bodies

F.O.B. Cleveland, $165.

Year-round comfort & class for Jeep owners. Kiln dried hardwoods, safety glass. Fine hardware, varnishes, top materials, only. Full-opening rear door, locks inside or out. Immediate U. S. shipments! Send 25% with order; balance C.O.D.

STATION WAGONS, INC., (S6)
6619 Euclid Ave., Cleveland, O.



LOCKSMITHING & KEY MAKING

COMPLETE UP-TO-DATE COURSE

How to pick locks, decode, make master-keys, repair, install, service, etc. 53 easy illustrated self-instruction lessons for every handy man, home-owner, carpenter, mechanic, hardw're dealers, maintenance men, etc. Satisfaction guarant'd. Send for Success-Catalog Free. Address below.

WATCH AND CLOCK REPAIRING

LEARN at HOME in Your Spare Time

Prepare for a happy future of prosperity and security—and get a good job Now. A fascinating, thorough self-instruction training in American and Swiss watches, clocks. Special section on alarm clock repairs. Fast-growing field. Success-Catalog Free. **NELSON CO., 1139 S. Wabash Av., Dept. F01 Chicago 5, Ill.**

HOW TO BUILD YOUR OWN CABIN OR BUNGALOW!

Here's an amazing big book that shows you *complete detailed plans* for building your own log cabin, wayside stand, tourist home, bungalow or hunting lodge! Yes, you'll find 250 jam-packed pages and 180 pictures and floor plans that tell you *everything you want to know*—how to lay a foundation . . . how to build walls . . . lay floor boards and roofs. You'll even read step-by-step details for building porches, garages . . . for cutting doors, windows, shutters . . . for building fireplaces, chimneys . . . and even for installing plumbing! Costs *only* $1.98!

SEND NO MONEY

Examine this big volume at our expense! *Order today!* On delivery deposit only $1.98 plus few cents postage with postman—or $2.48 for handsomely bound De-Luxe edition. If after 7 days' *free trial* you aren't delighted, return it for refund.

MAIL COUPON NOW!

POPULAR SCIENCE Publishing Co., Dept. 67
353 Fourth Avenue, New York 10, N. Y.

Send *"How to Build Cabins"* in edition checked:

☐ **DeLuxe Edition $2.48** ☐ **Regular Edition $1.98**

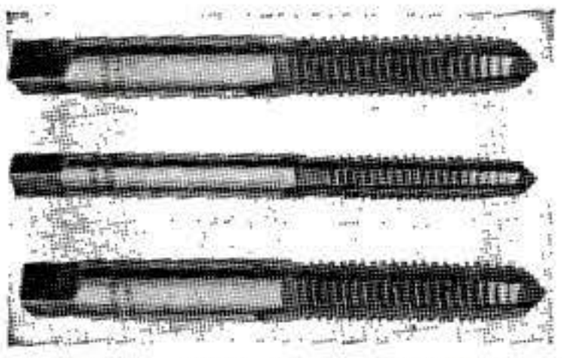
I will pay postman price plus postage. If not delighted, I may return book within 7 days for full refund.

Name.....

Address.....

City..... Zone..... State.....

☐ Check here if you send payment with order, and we will pay all shipping costs. Same return privilege.



HIGH SPEED

TAP SETS

Set of 10 taps ¼ to ½ NC and NF threads **$7.00**

Set of 14 taps 3-48 to 12-24 inclusive NC and NF threads **$6.50**

Send 40c for complete catalogue of machine shop equipment refunded on first order of $10.00

VETERAN TOOL & SUPPLY CO.
88 Baxter St., New York 3, N. Y.

HEADPHONES

(Army P-23) 8000 ohm impedance. Leather covered, adjustable. With 5 ft. cord & PL-55.....$1.49

Rubber Phone Cushions for above. Per pair 20c

HEADBANDS (P-23) only, with 13" tipped cord & PL-54.....39c

EXPERIMENTAL TUBES. 20 asstd. receiving types for testing, research, etc. Filament tested $1.00

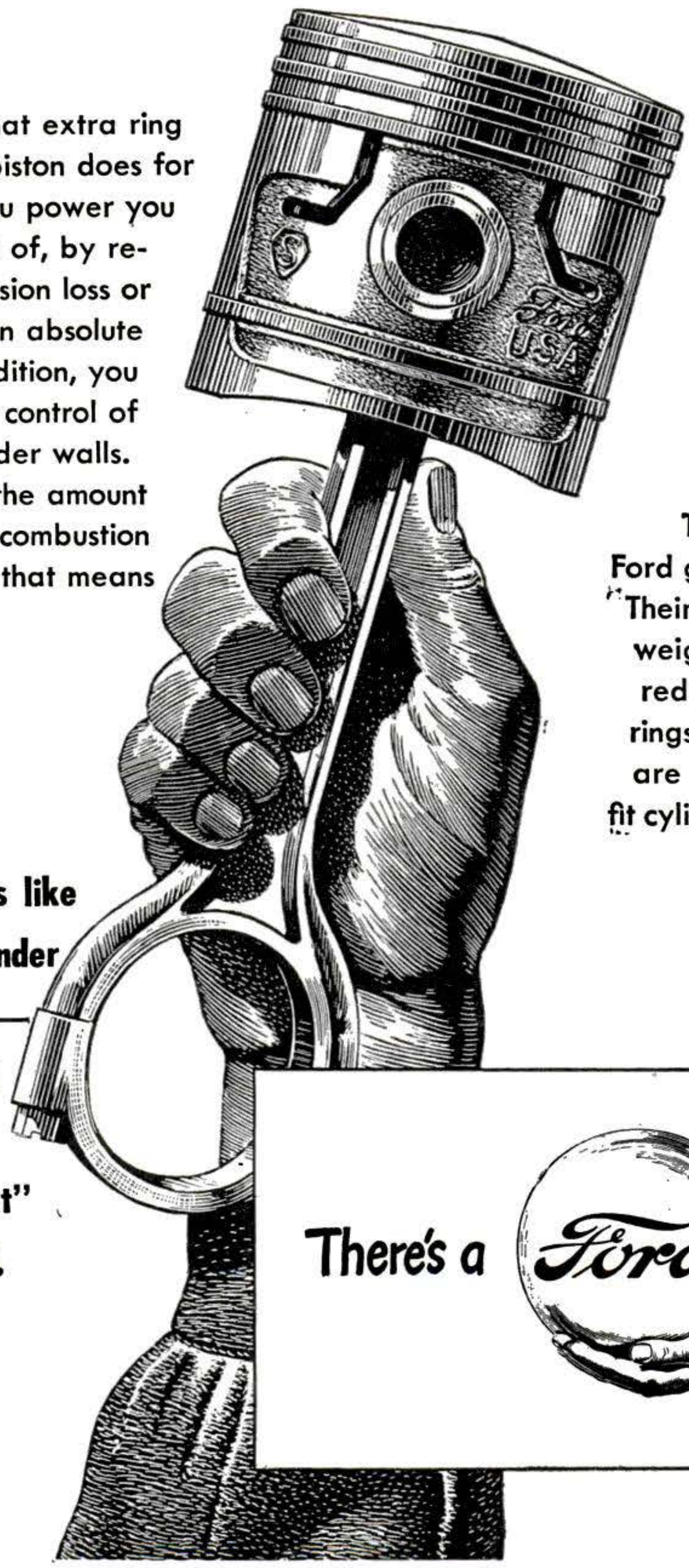
Brand new **R.C.A. UX-200** tubes in sealed cartons. Ideal triode detector .....8 for $1.00

WRITE TODAY FOR BARGAIN BULLETINS

LEOTONE RADIO COMPANY 67 DEY ST. NEW YORK 7, N.Y.

Copyrighted material

"Blow-by" gets the "go-by" from Ford's 4th piston ring!



Here's what that extra ring in every Ford piston does for you. It gives you power you never dreamed of, by reducing compression loss or "blow-by" to an absolute minimum. In addition, you also get better control of oil film on cylinder walls. This cuts down the amount of oil reaching combustion chambers. And that means oil savings!

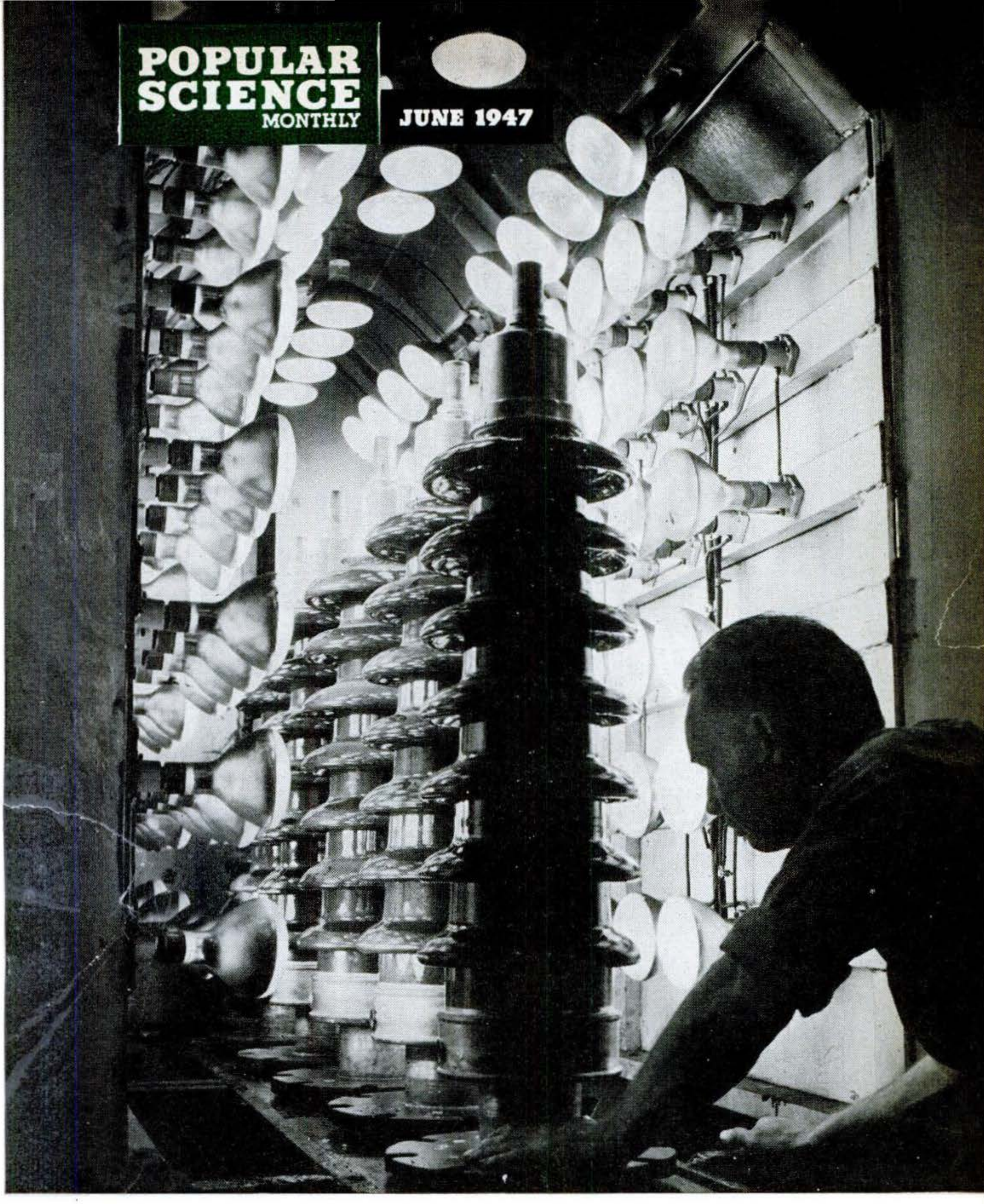
The ring in the bottom of the skirt removes most of the oil. The upper oil control ring allows just the right amount of oil to pass to lubricate the compression rings and prevent scuffing.

Teamed with this 4-ring feature, Ford gives you aluminum alloy pistons. Their double advantage of lighter weight and higher heat conductivity reduces bearing loads and keeps rings from sticking. And Ford pistons are slotted and cam-ground to best fit cylinders for slap-free oil economy.

With features like these, no wonder Ford engines—both SIX and V-8—are far "out front" in their field.

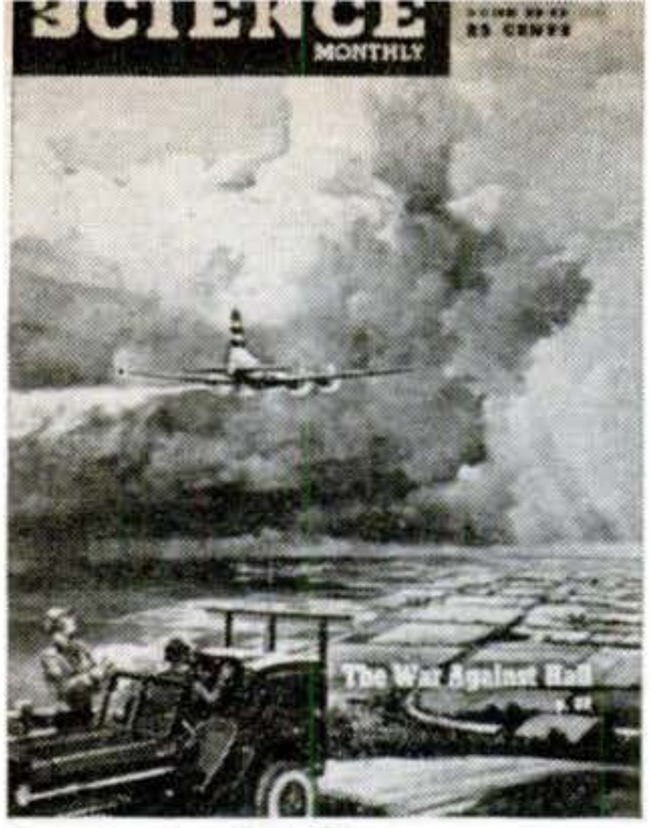
There's a Ford in your future

Copyrighted material



"Cooking" with Light... A battery of 120 infrared lamps, massed in this tunnel of light at the Westinghouse plant at East Pittsburgh, serves as a preheating furnace for big porcelain condenser bushings—the channels by which high-voltage currents reach transformers and circuit breakers. The bushings, on their way to receive a filling of insulating plastic, are heated to about 266° F. to prevent them from cracking, as they would otherwise, when the plastic is poured at that temperature.

Copyrighted material



Painting by Eric Sloane

Advancing from man-made snow to man-made weather, science and the AAF are ready to battle costly storms that batter U.S.

The War Against Hail

By Martin Mann

THE morning of Aug. 18, 1925, was hot and muggy in the flat farm lands of southeastern Iowa. The green, tall corn, almost ready to husk, grew so fast you could almost hear it. Off to the west, heavy thunderclouds promised a cool evening. Instead they brought disaster that even a city man could feel in his heart and pocket.

Midmorning, it hailed.

A half hour later the corn was only a worthless mush pounded into the ground. Poultry and livestock had been killed, windows broken, roofs smashed, automobiles damaged. *Those terrible 30 minutes cost the local farmers $2,500,000.*

Hailstones as big as this 1940 Oklahoma sample, riding 100-mile-an-hour winds, can kill cattle.

This one storm was not the worst. Between June 7 and 20, 1928, hailstorm after hailstorm bombarded Kansas. The loss: $11,200,000. Only last year, on May 16, a four-minute blast of hail swept San Antonio. That evening's bill was $5,030,000.

But soon the tribute paid to hail—totaling almost $60,000,000 in 1944—may be saved for better purposes. The war against hail has been declared. This summer, the Army and Navy will try to convert brutal hailstorms into gentle showers of rain.

Airplanes of the AAF Weather Equipment Flight Detachment will scatter silver iodide smoke or dry-ice pellets through the huge cumulo-nimbus thunderclouds that often produce hail. This "seeding" is expected to change the clouds to snow, which will melt to rain before reaching the ground.

According to Vincent J. Schaefer, the General Electric Company scientist who was the first man to start a snowstorm (PSM, Jan. '47, p. 78), the seeding might also be done by sending up rockets or drone planes equipped with automatic smoke or dry-ice dispensers, or setting up portable smoke generators on the ground so that the strong updrafts generally accompanying hailstorms would suck the smoke seeds into the clouds.

The clouds from which hail falls are tall, turbulent pillars of supercooled water vapor

Copyrighted material

Set for take-off on a weather-control mission, Capt. C. N. Chamberlain, Jr., waves from his specially equipped B-25. He is a pilot in the Weather Equipment Flight Detachment of the AAF.

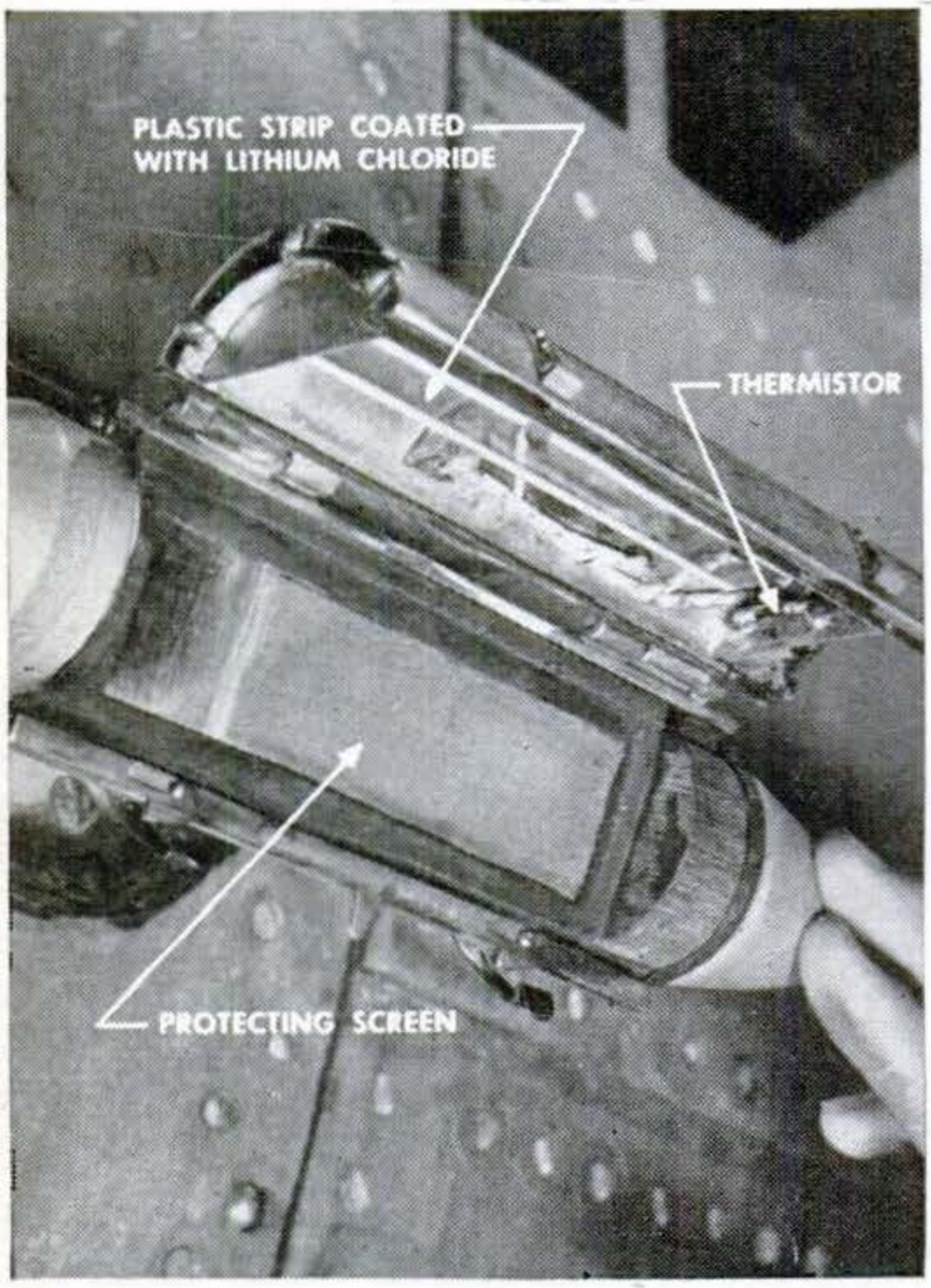
Copyrighted material

WET- AND DRY-BULB THERMOMETER ELEMENTS

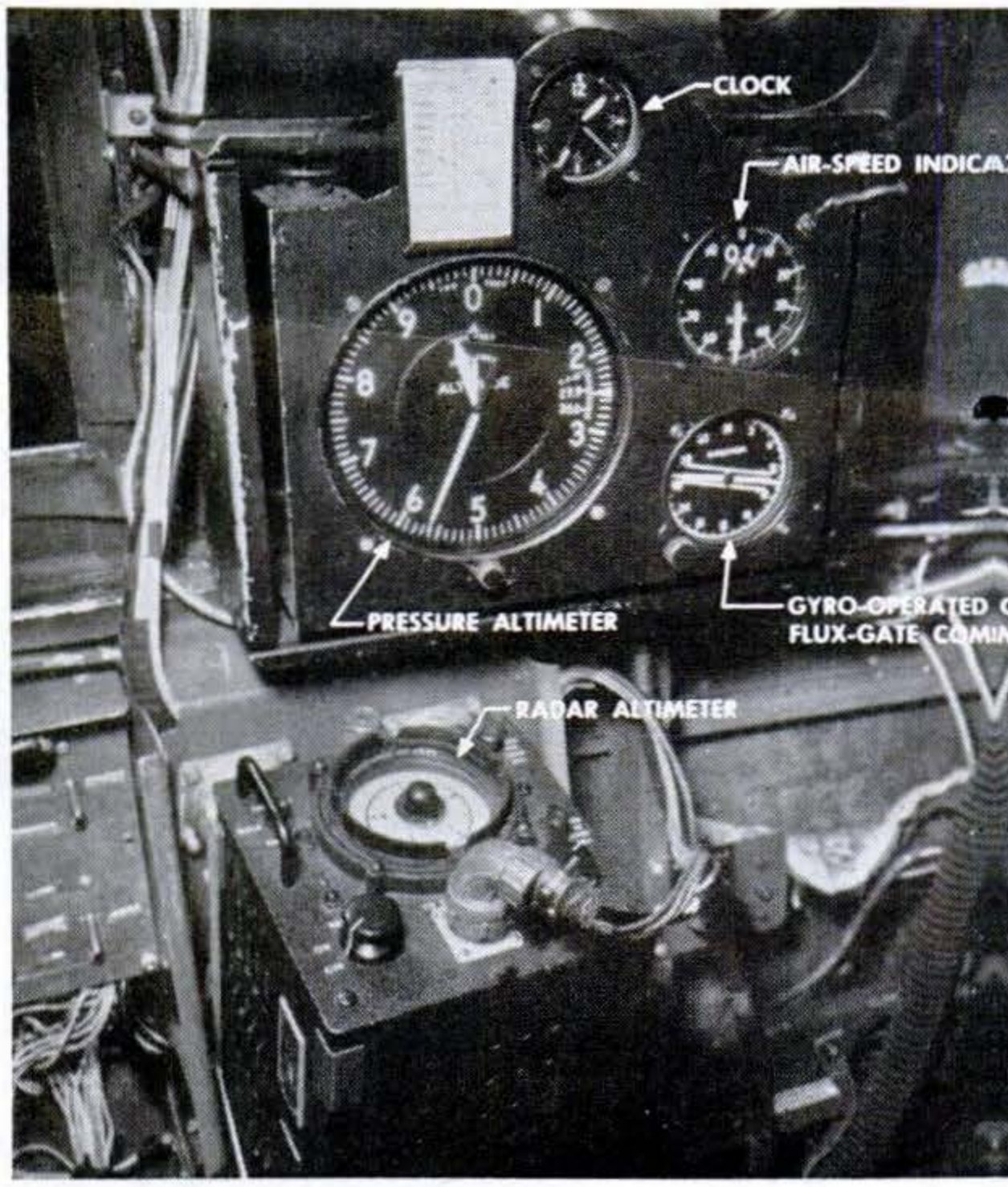
ELECTRIC AEROGRAPH ELEMENTS

MECHANICAL AEROGRAPH ELEMENTS

Aerographs on the side of this weather plane measure temperature and humidity, recording them automatically. The wet- and dry-bulb thermometers are used to calibrate the aerograph readings.



Electric aerograph's thermistor measures temperature; the lithium chloride unit, humidity. The screen filters out dust and liquid moisture. A mechanical aerograph has a human hair to tell humidity, a bimetal strip for temperature.



On a test flight, the weather observer must record altitude, airspeed, course and other information. The radar altimeter provides a reading of actual height above the earth for comparison with altitude shown by the pressure altimeter.

Copyrighted material

(tiny drops of water that are colder than the freezing temperature, 32° F., but have not yet frozen). The droplets are caught in the strong updrafts and thrown to cold, high altitudes. There they freeze, then plunge down, and grow in size as more moisture freezes on them. The updrafts may whip them up repeatedly and cause them to acquire other shells of ice as they fall again. A hailstone 17 inches in circumference fell at Potter, Nebr., on July 6, 1928!

Such a natural ferris wheel could be stopped by removing all the water at once. Silver iodide crystals trick droplets into freezing on them; iodide crystals look just like ice crystals, and water vapor can't tell them apart. It freezes around them just as it does around an ice crystal. Dry ice works differently. It produces huge quantities of submicroscopic ice nuclei, each containing only a few molecules. This crystallization process releases heat that causes turbulence, spreading the ice crystals throughout the cloud. They then act as natural seeds and change the entire cloud to snow.

In both cases all of the cloud is converted into snow particles, leaving no supercooled moisture to form huge hailstones. Either method is cheap: one pea-sized pellet of dry ice could conceivably produce 300,000 tons of snow, and 200 pounds of silver iodide would seed the whole United States.

Army Seeks Ice-free Air

Basically, seeding "triggers" a supercooled cloud, making it give up moisture before it naturally would. Since hailstorms are not the only kind of weather born in supercooled clouds, this method has other valuable uses.

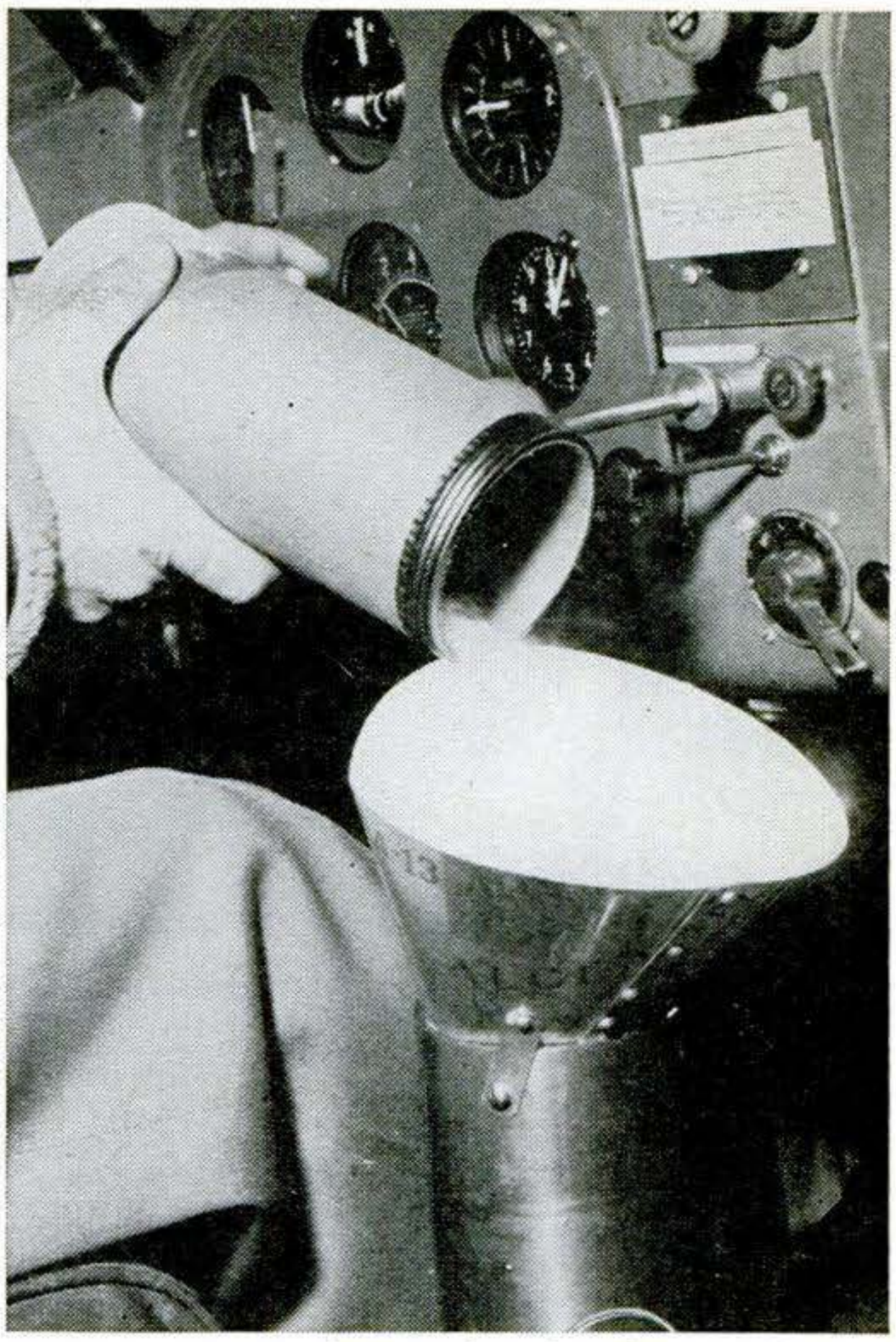
It could eliminate the supercooled clouds that cause icing over airfields. This is what the Army is now trying to do.

It could stop the snowstorms that come in from the Great Lakes every winter, paralyzing Buffalo and choking its vital rail yards. The snow clouds could be triggered while still over the lakes.

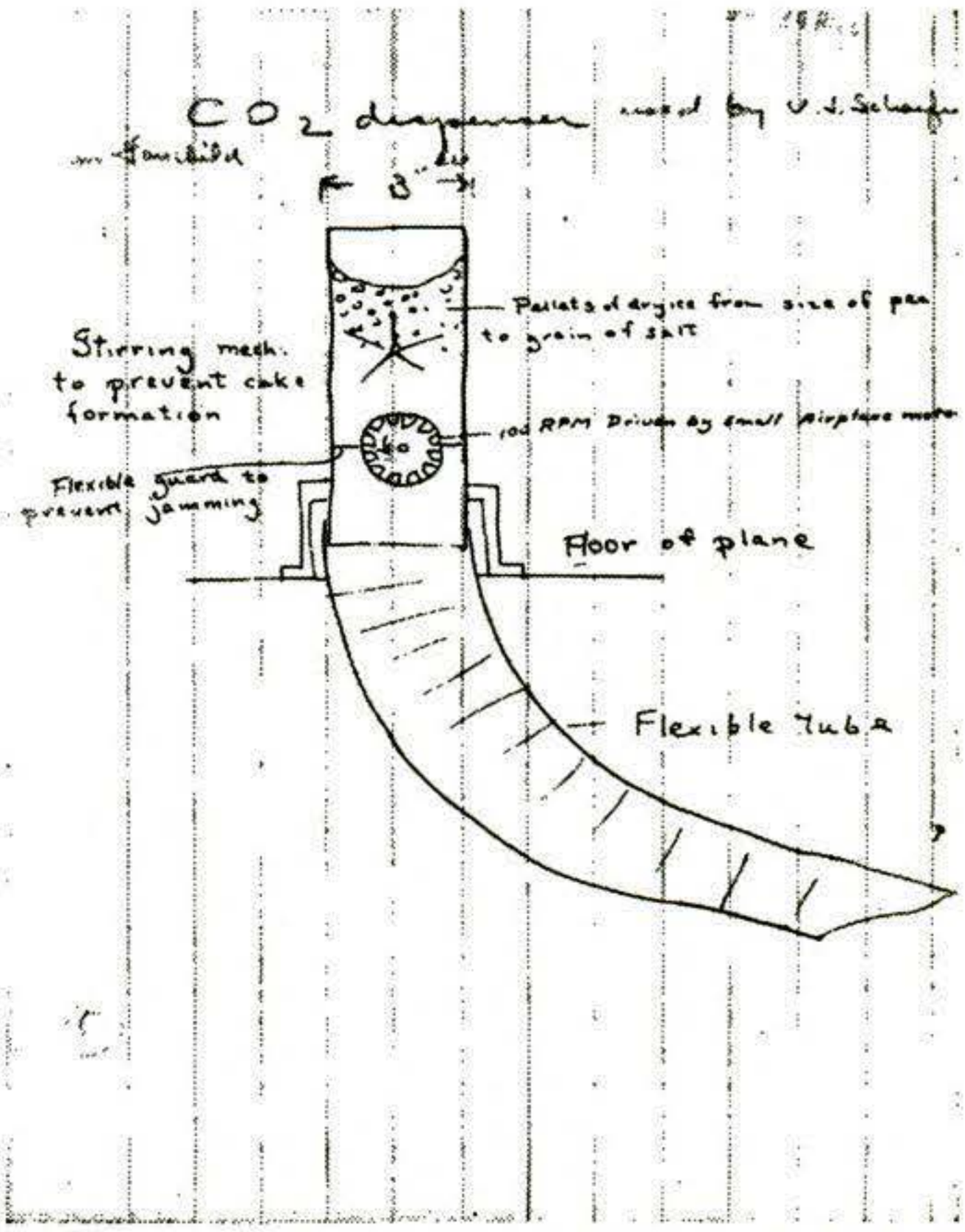
It might make rain in some deserts—possibly convert them to fertile farm lands. Supercooled clouds frequently pass over desert areas only to evaporate into dry air.

Its military possibilities are almost fantastic. Snow and rain forced at strategic points could cripple communications. Rain clouds might be triggered before they reached "breadbasket" regions, and drought and famine would soon cripple the foe.

Although changing a cloud into snow is



Dry ice is poured into this distributing device, mounted in an airplane's floor, to seed a cloud.



Schaefer, the first man to make snow, dashed off this rough sketch of his dry-ice dispenser for PSM. Even this gadget isn't really necessary, according to Dr. Langmuir. He says the dry ice could be sprinkled out of an ice-cream box.

Copyrighted material

From this supercooled alto-stratus cloud, dry-ice pellets produced the first man-made snow.

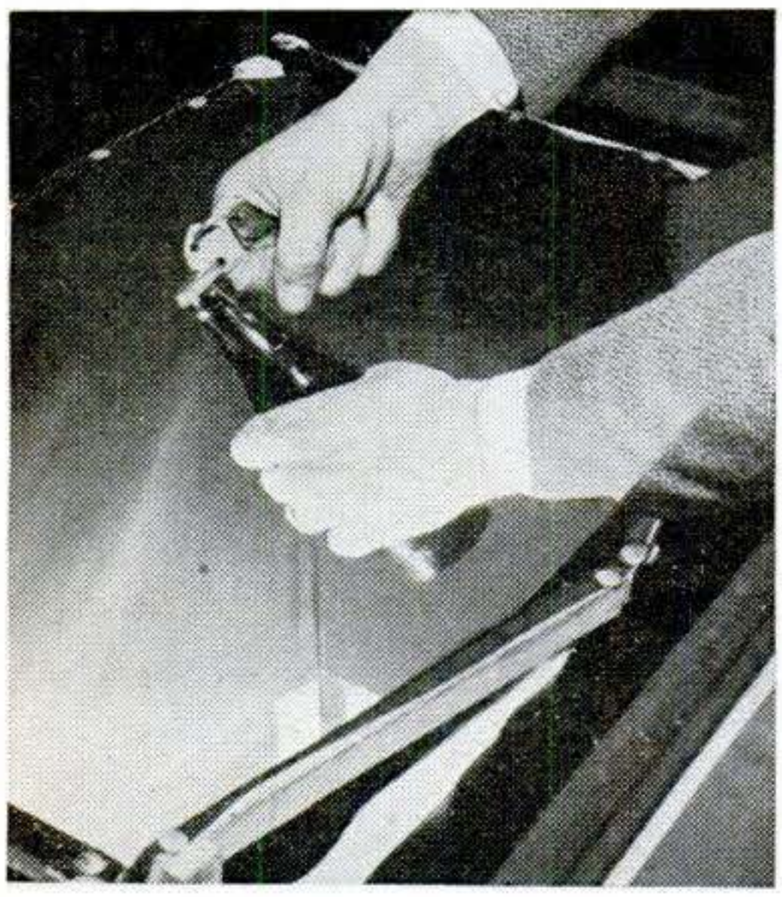
fairly simple (on p. 88 you can see how to do it at home), it took lots of hard work and brilliant reasoning to find that out. The research can be traced back more than 20 years to the famous small-particle theory of Dr. Irving Langmuir, a Nobel prize winner who is associate director of the GE Research Laboratory and Schaefer's boss.

For almost as long, Schaefer has been interested in snow. Although he left school at 16 and has spent practically every spare minute since then educating himself into a top-ranking scientist, he still found time to go skiing. That led to a study of snowflakes.

Schaefer discovered that supercooled water vapor suddenly changes to snow at −31° F., and, still more interesting, that only part of the vapor need be cooled that much to turn a whole cloud to snow. A little dry ice (temperature: −110° F.) chills a cloud enough to start snow.

On Nov. 13, 1946, he tried dry ice on a real cloud—a three-mile alto-stratus 14,000 feet over Greylock Mountain, Mass. That three-mile cloud turned completely into snow!

Snow-makers were quickly developed. The dry-ice dispenser is basically no more than a funnel, and the generator for silver iodide smoke consists only of an oxyacetylene torch, an electric motor and a jet of cold



Opening a pop bottle (left) or pricking a tiny balloon (right) in a supercooled cloud allows gas to expand, lowers temperature and creates a snowstorm. Dr. Langmuir (center) produces the necessary cloud by blowing into a cold chamber as Schaefer and two Army observers look on.

Copyrighted material

Curtains of snow begin to fall as ice germs grow at the expense of minute water droplets.

air. The motor slowly feeds string impregnated with silver iodide into the torch flame. The cold-air jet then condenses the silver iodide vapor into tiny particles the right size for snow seeds.

Schaefer's seeding technique works on only a single kind of cloud: one made of supercooled water vapor. But if there is a trigger that eliminates supercooled clouds, there must be other triggers for other clouds. With enough triggers, weather could be made to order!

Seeking the "Why"

Already scientists are looking for those other triggers. At the Institute for Advanced Study in Princeton, N. J., Dr. John von Neumann hopes to find the "why" of weather —the foundation on which weather control must be built.

Right now we know precious little about weather, but meteorologists have learned that weather changes are caused by such things as the varying amounts of heat received from the sun, the rotation of the earth, and the presence of oceans and mountains. These causes have even been reduced to mathematical formulas. Unfortunately, the formulas are so complicated that a whole crew of mathematicians would have to work until next week to figure out tomorrow's weather!

This hurdle seemed insurmountable until the war brought amazingly fast automatic computers. Now a new type, employing a tube that can "remember" thousands of numbers (see p. 144), is being built by the Institute for Advanced Study and the RCA Laboratories. In minutes, it can solve problems that would take years by ordinary methods.

With the new computer, Dr. von Neumann plans to test the weather equations, comparing their predictions to the actual weather, then correcting the equations until reliable long-range forecasts can be made.

Once the weather equations are perfected, Dr. von Neumann and Dr. V. K. Zworykin, vice-president of RCA Laboratories, foresee their use to control weather through "model experiments." Figures corresponding to imaginary weather conditions will be fed into the computer. It will then forecast what weather would have resulted. For example, the machine would show how a higher temperature over the Caribbean Sea would have affected the weather in Miami.

Imitating an Island

Only small temperature difference at one critical location can produce radical weather changes, says Dr. Zworykin, citing small ocean islands as an example. In the daytime, the temperature above the island is a few degrees higher than the temperature above the surrounding water because the island surface absorbs more heat from the sky than the water does. This is enough to produce updrafts that cause clouds to rise high above the island, being cooled in the process so that they turn into rain.

Dr. Zworykin proposes to imitate this

Copyrighted material

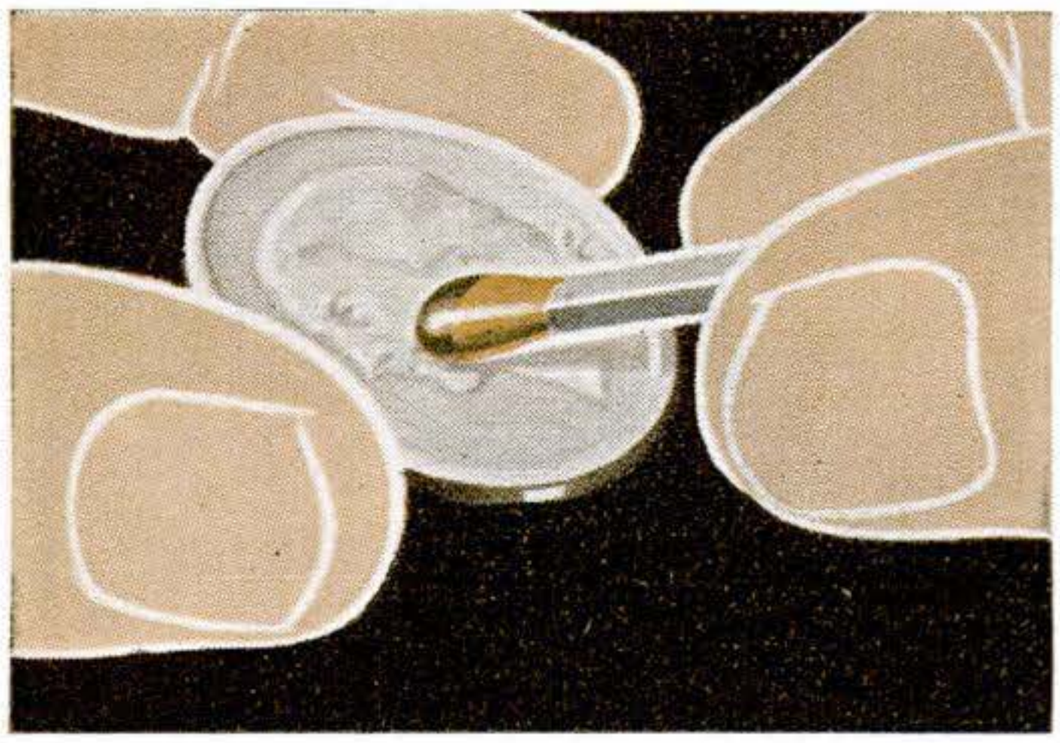
natural triggering process by creating artificial areas that could be either highly absorbing or highly reflecting. A thin layer of carbon black would absorb heat. By covering it with white smoke, it would become reflecting.

These areas would have to be placed in exactly the right spots and used at exactly the right times. Haphazard changes in the heat put into the air could make no change in the weather—the forces involved are far too great to be influenced directly. Yet the energy absorbed by a few square miles of carbon black on a South Atlantic island might save Florida from a hurricane, because it acts as a trigger. It does not try to stand in the way of the hurricane forces; it merely upsets their already shaky balance.

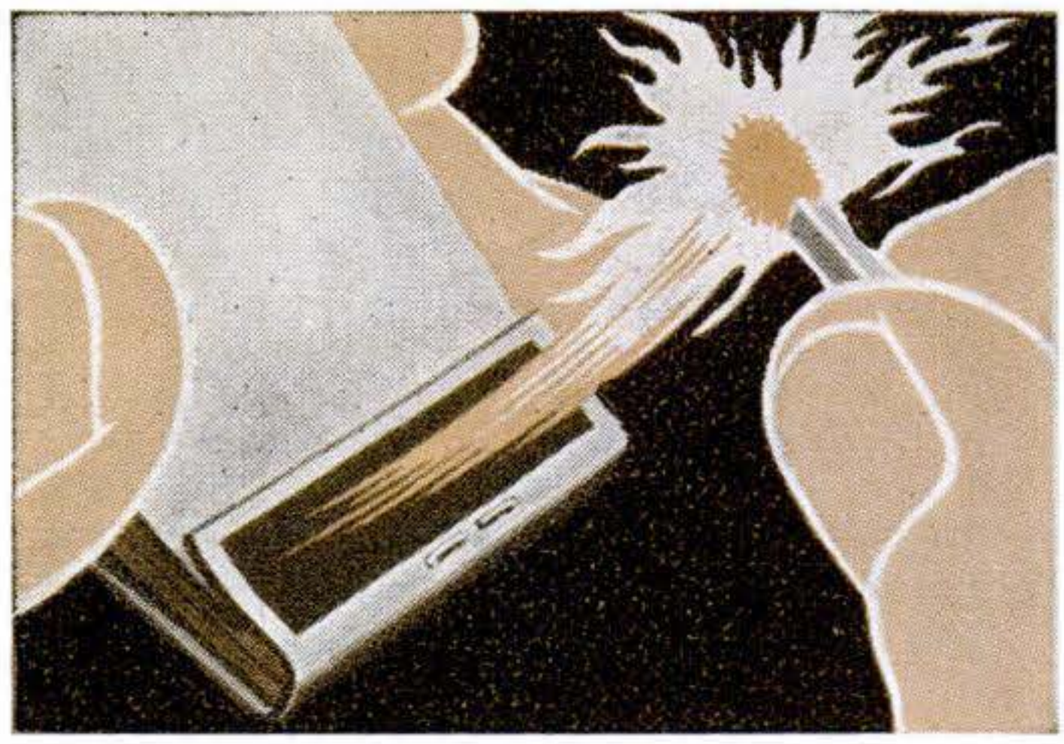
Finding out where and when a small amount of energy will work as a trigger is the big problem, and one that cannot be solved today. It won't be solved tomorrow, either, for the electronic computer able to furnish the answer is not expected to be ready until 1949. Hail prevention appears much closer. END

How to Make Snow at Home

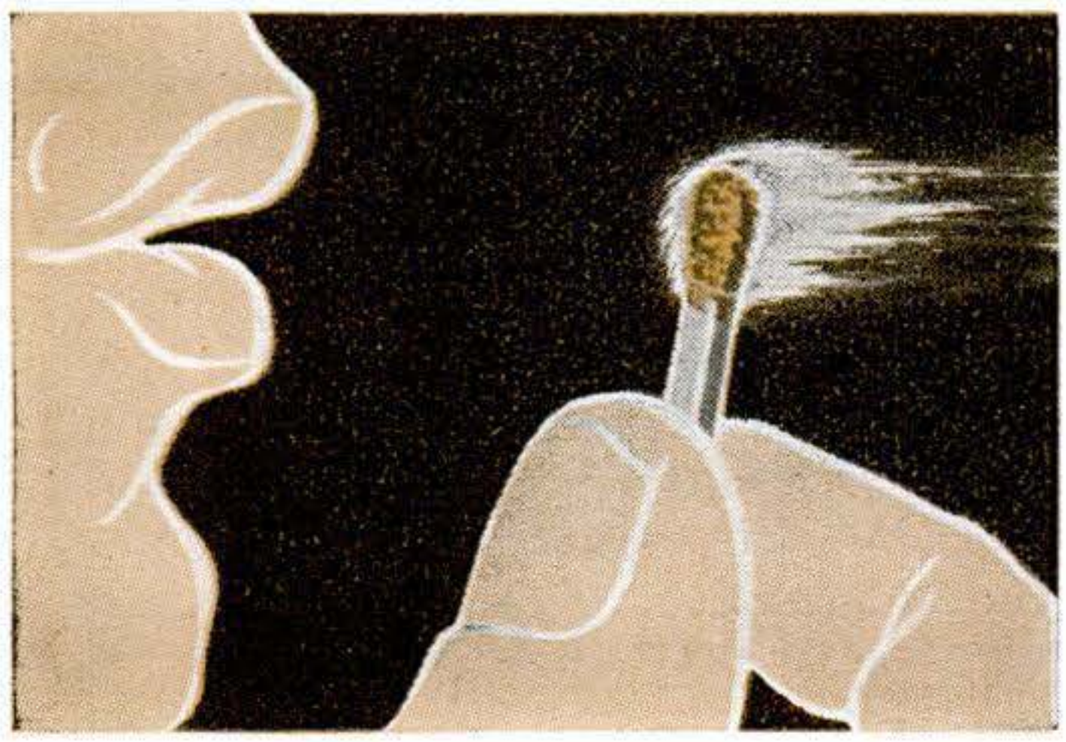
ALL you need to make your own snow are a book of safety matches, a silver coin, a drop of iodine and some cold air in an enclosed space. A black background and a flashlight help, however, by making the tiny flakes visible. The procedure is shown below. For cold air, try any of the following: (1) the inside of a home freezer or a frozen-food cabinet; (2) a big empty jar, chilled by packing dry ice around it in a bucket *(but don't touch the dry ice with bare hands!)*; (3) the inside of a closed car, or a similar space, on a cold winter night. Blowing into the ice-cube section of a refrigerator won't work, because all the cold air spills out of it when the door is opened.



1. Put a drop of iodine on a match head and rub it on a quarter. Some silver will adhere to it.



2. Strike the match. When it burns, its smoke will contain microscopic silver iodide crystals.

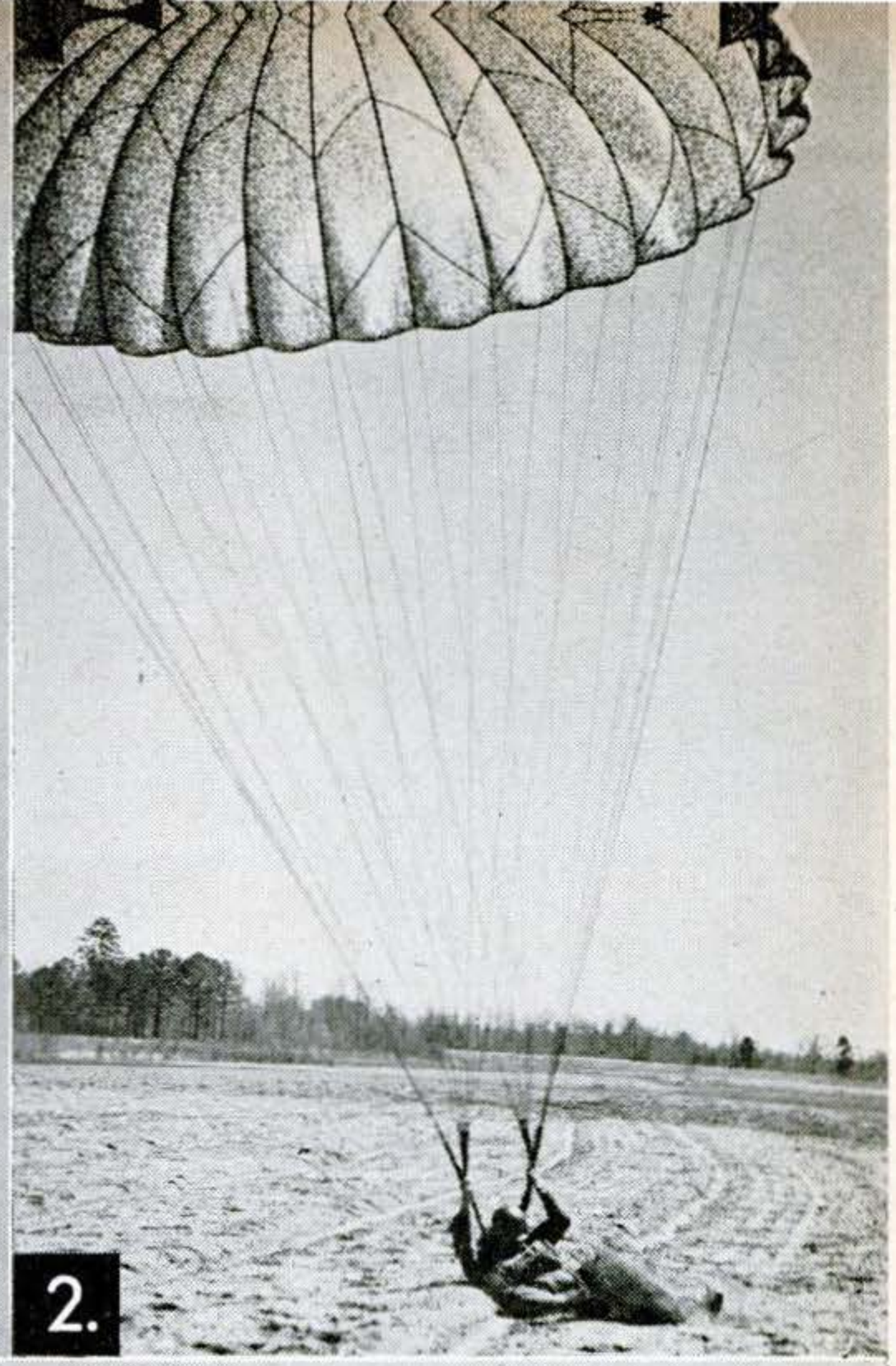


3. Blow it out in cold-air space (below 10° F.). Water vapor in your breath becomes supercooled.

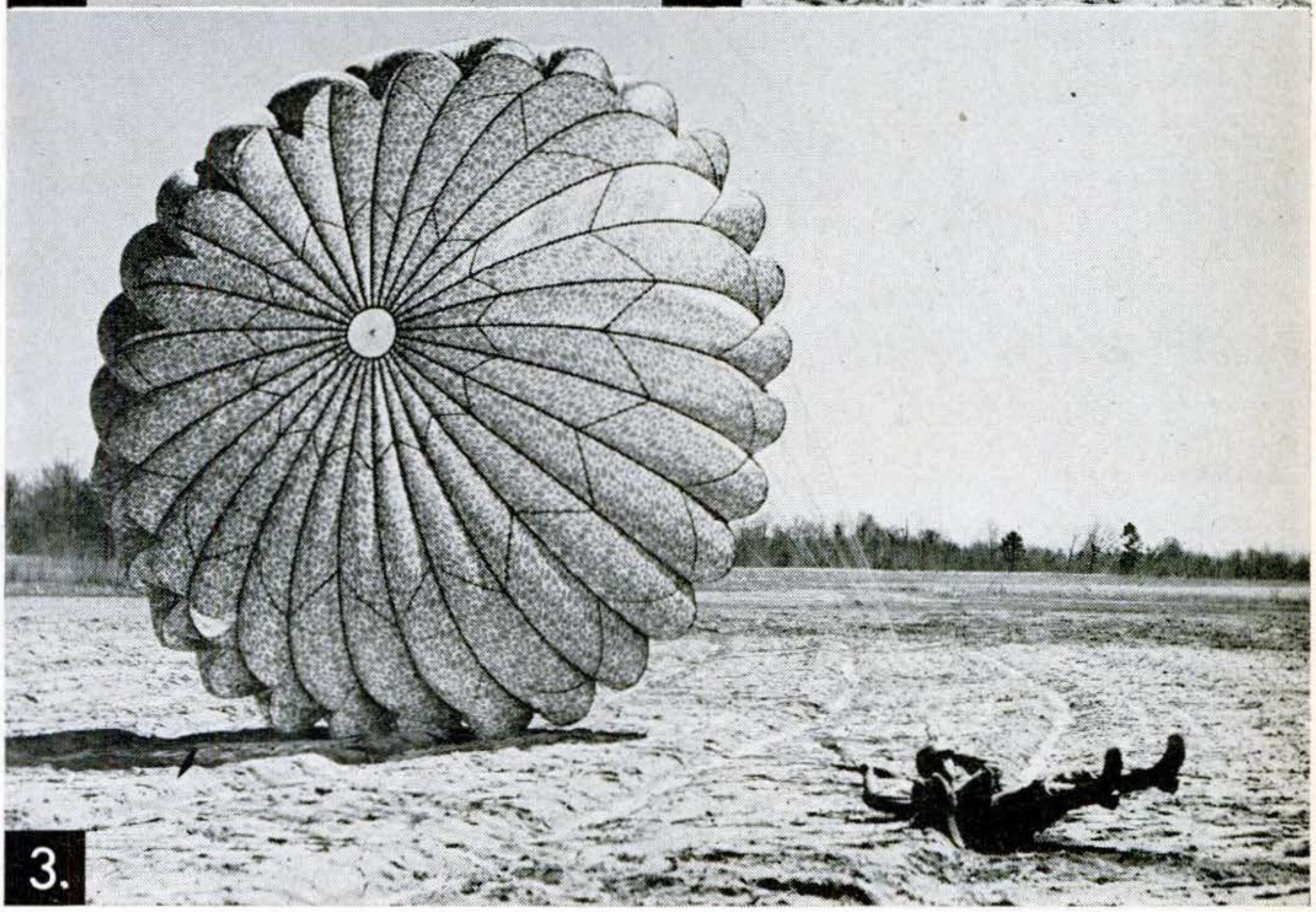
4. Vapor freezes upon the silver iodide seeds, and a flashlight ray reveals shining snowflakes.

Copyrighted material

1.



2.

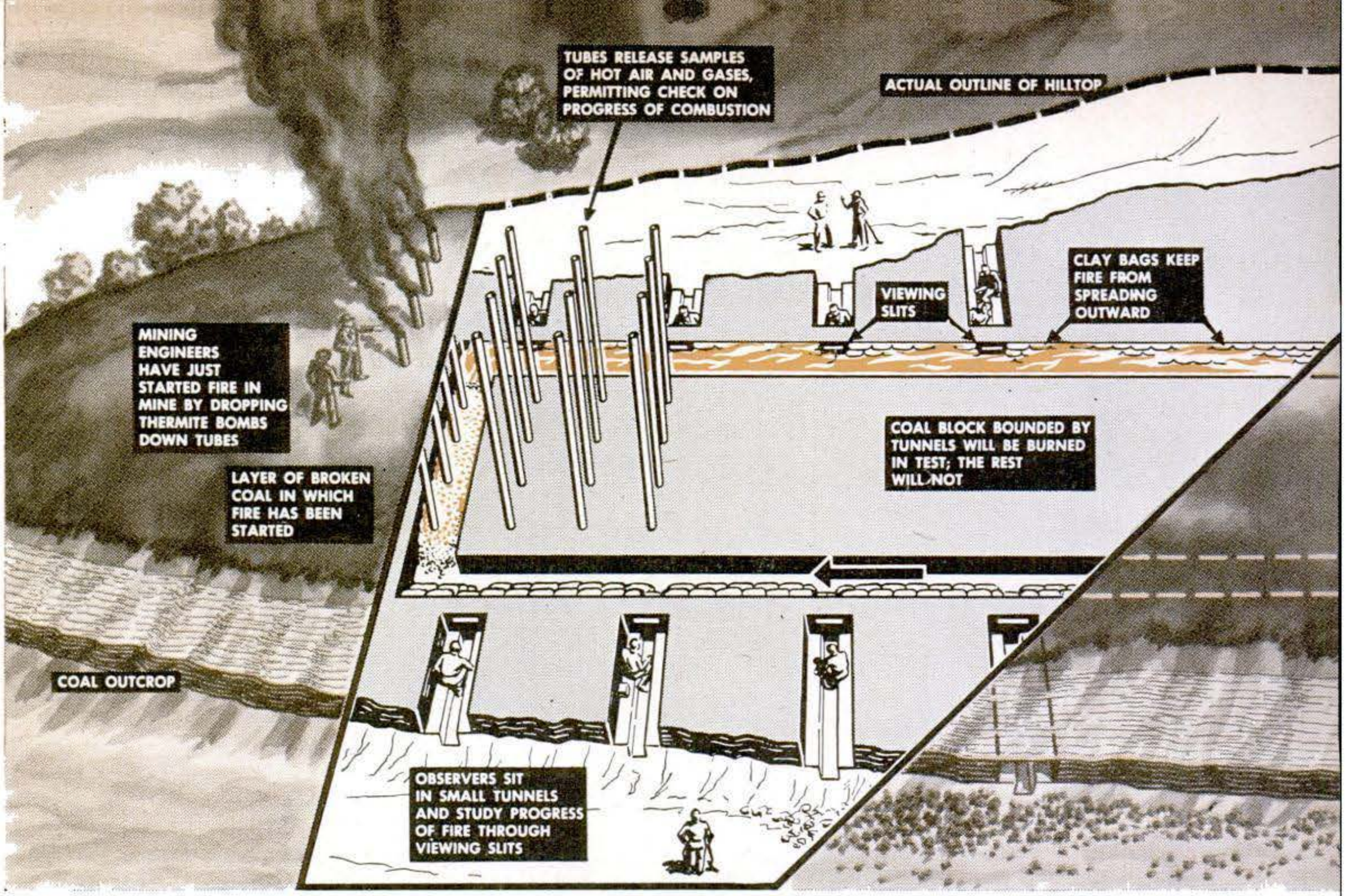


3.

One for the Books

A PARACHUTE landing as perfect as any illustrated in the textbooks is shown in these unusual pictures, taken recently during airborne training at Fort Benning, Ga.

Copyrighted material



This artist's conception illustrates the firing of a test mine similar to the one near Jasper, Ala.

Minerless Mine Preburns Coal

By Hartley E. Howe

DOWN in the red Alabama hills, a wisp of dirty smoke over a claybank marks the birthplace of a revolution—a revolution in America's economy. If it succeeds, the coal miner may be released from his daily struggle with death in the dark. Industry may save the cost of hacking out and carrying bulk fuel. The city consumer may escape the rain of hundreds of thousands of tons of coal dust and ashes. And the United States may tap vast natural resources now wasted.

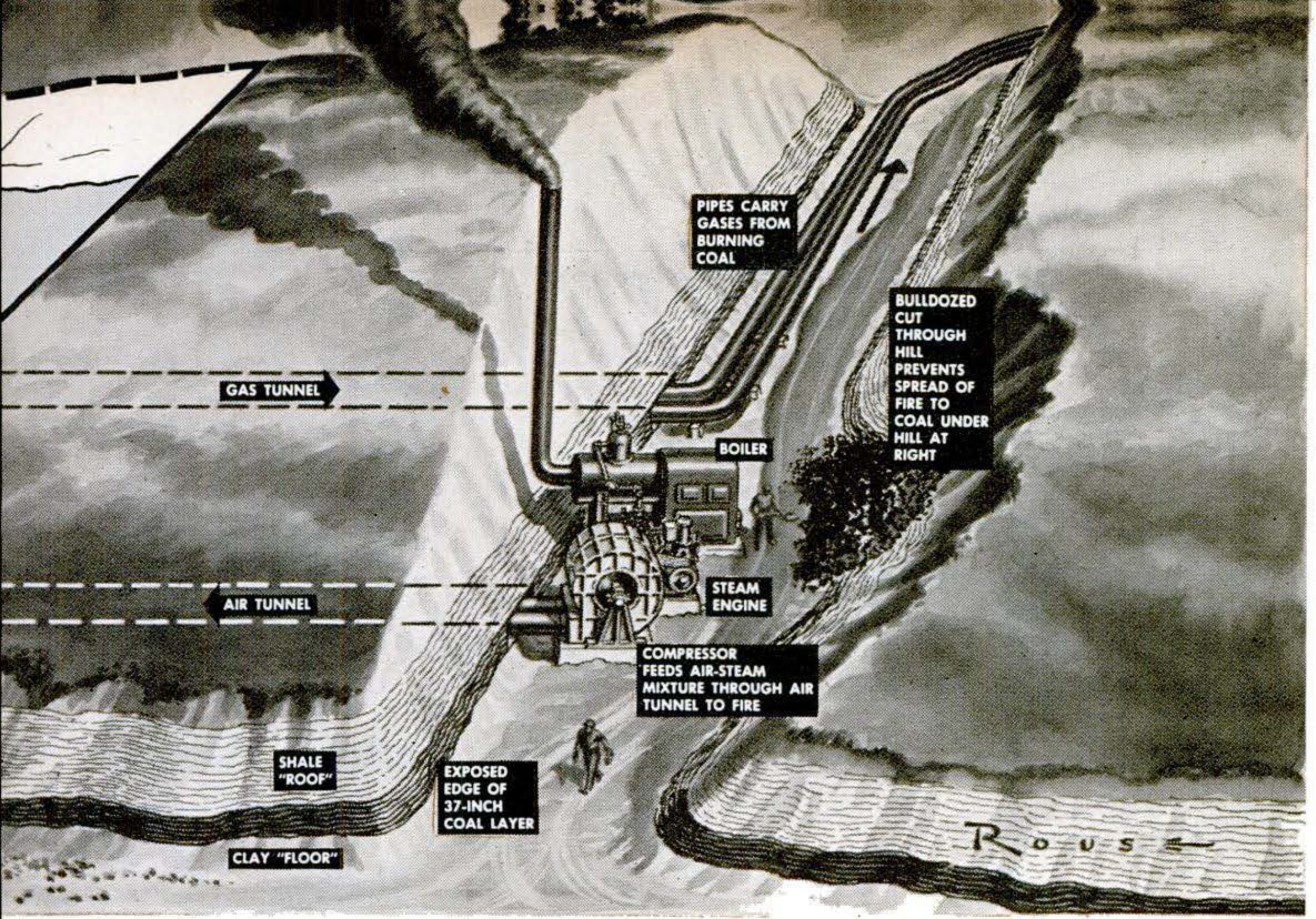
For no coal would leave a mine. It would be burned in the ground, where nature left it. Just as it was burned in Jasper, Ala.

For there coal gas was made in the mine in a joint test by the Alabama Power Co. and the U. S. Bureau of Mines. A 400-foot spur containing a wide, three-foot seam of coal was isolated by bulldozing across its base. From this cut a U-shaped tunnel was driven into the coal and the center section, about 150 by 40 feet, was fired.

To feed the flames, a blower pushed air or oxygen into one of the main tunnels. Sometimes live steam was used alternately with air, since this combines with carbon at a high temperature to produce the desired hydrogen and carbon monoxide. The resulting gases were forced out of the tunnel pipe at the other end of the U. The flames burned toward the source of needed oxygen, while clay bags kept them from spreading sideways.

The immediate goal is to find a way to use our huge deposits of coal so low in fuel value that they're not worth mining. But if successful, underground gasification may end all coal mining—and pay off in a big way. For cutting out, sorting and cleaning coal is dangerous and expensive, and to carry a ton from a West Virginia mine to New York City costs as much as to dig it.

Copyrighted material



Utilization of the coal gas is not shown. There are a variety of industrial applications possible.

The gas from a burning mine can be piped to the consumer or stored in tanks. It can be burned at the mine head to run steam generators, and sent to the consumer as electric power. It can be put directly to work spinning gas turbines. Or the gas might not be burned at all, but used as a raw material for the extraction of high-octane gasoline, lubricating and Diesel oils, and synthetic alcohols.

But all this is a good way ahead. Gas from the Jasper mine—a low grade—was used only for testing. Much has been learned since the fire was quenched and bulldozers scraped away the rock. Foreign experts—the Russians and Belgians have been working hard on the project—had claimed a level seam wouldn't burn as well as a tilted one. The level Jasper seam burned satisfactorily—virtually all the useful gases were forced out. Would the roof stay up long enough for the fire to get started? Would it fall, as desired, when it burned down so far that air could not be pushed in to keep it burning? It did hold up and it did fall, just right. Could the fire be controlled? No trouble at Jasper; when the flames began burning sideways after consuming the seam, water and steam were pumped in and investigators were able to follow soon after. Will tar clog the pipes? It didn't at Jasper.

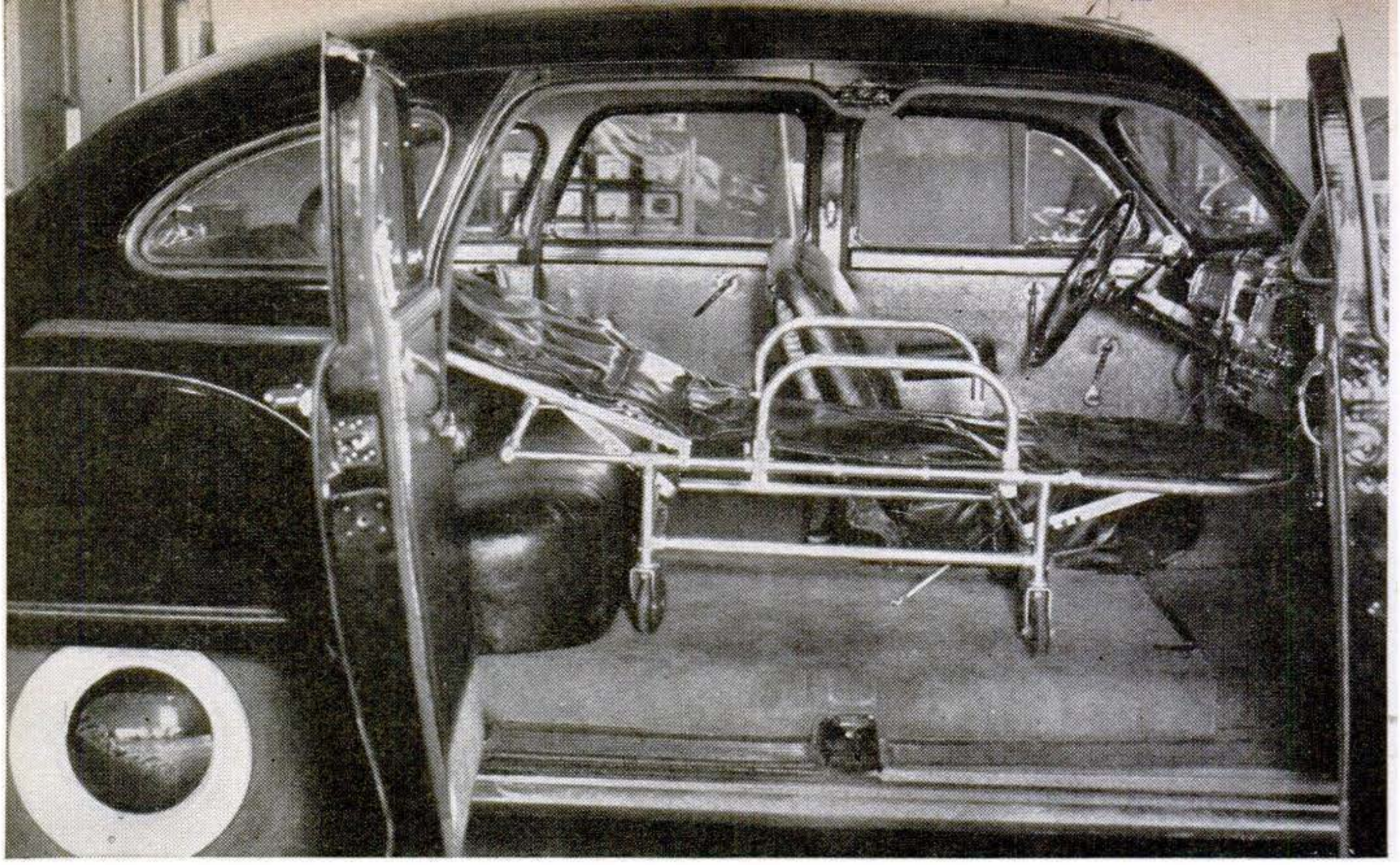
The Jasper test used the full-shaft method suggested many years ago by Sir William Ramsey. Costs might be cut further with the Ranney technique now employed in boring for coal or water. Shafts a few inches in diameter are drilled far underground but parallel to the surface. These would replace the expensive man-sized tunnels with a series of small combustion flues.

Jasper was the first in a two-year series of experiments. The next test is planned for a seam near an Alabama Power Co. plant, where gases can be piped in to run generators. Depths will be plumbed where greater air pressure can be used, although engineers will not be able to move in afterwards to check subsurface results.

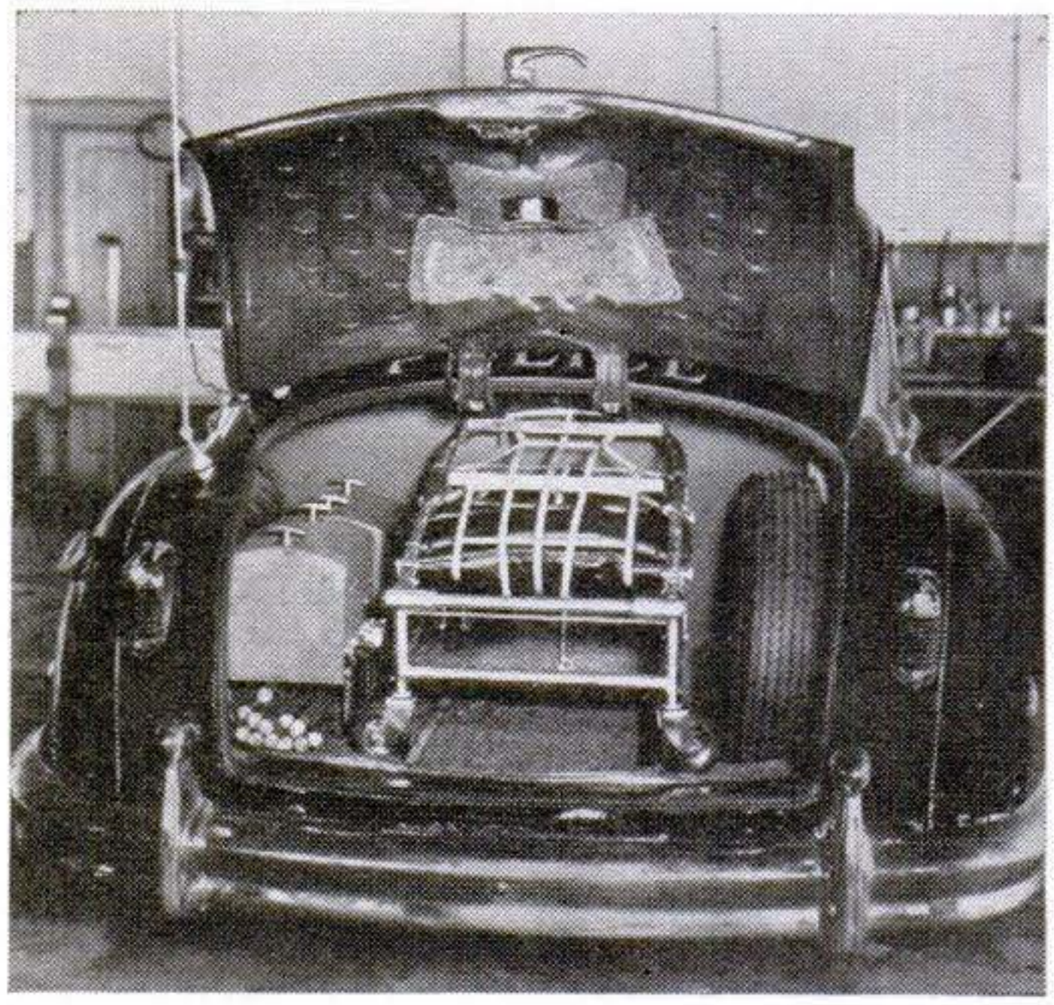
Russia, with huge deposits of low-grade brown lignite, hopes to use the Ramsey process to heat the entire city of Moscow. And the present Five-year Plan calls for 33 billion cubic feet of gas to be produced annually through underground firing by 1950.

No wonder the fuel industries of America have their eyes fixed on Alabama. It may hold their future in its flaming depths. END

Copyrighted material



Prowl Car Packs Bed



IN NO more time than you often spend waiting for a traffic light to change, this Illinois police car can be converted into an emergency ambulance.

A six-passenger sedan, it carries a collapsible stretcher in its trunk compartment. When used as an ambulance, the right half of the front seat is moved out and put in the trunk. The stretcher is unfolded and placed on the floor of the car, as shown above. Removal of the door post makes loading easy. Devised by the Chrysler-Plymouth dealers of Joliet, Ill., the conversion takes less than 90 seconds. The car is air-conditioned and carries radio and first-aid equipment.

Electric Drum Timer

THE drummer of the Ward Island Military Band at Corpus Christi, Tex., is never out of step now. Complaints that the band marched too fast, too slow, or both, prompted him to devise an electric drum timer.

It consists of a square-wave multivibrator, batteries and a set of headphones. When the frequency of the oscillator is set at the proper marching tempo, the drummer finds it easy to stay in time and thereby keep the whole band that way, too.

Accused of thus substituting electronics for musical instinct, the band insists that it is simply supplementing musical instinct with electronics.

Copyrighted material

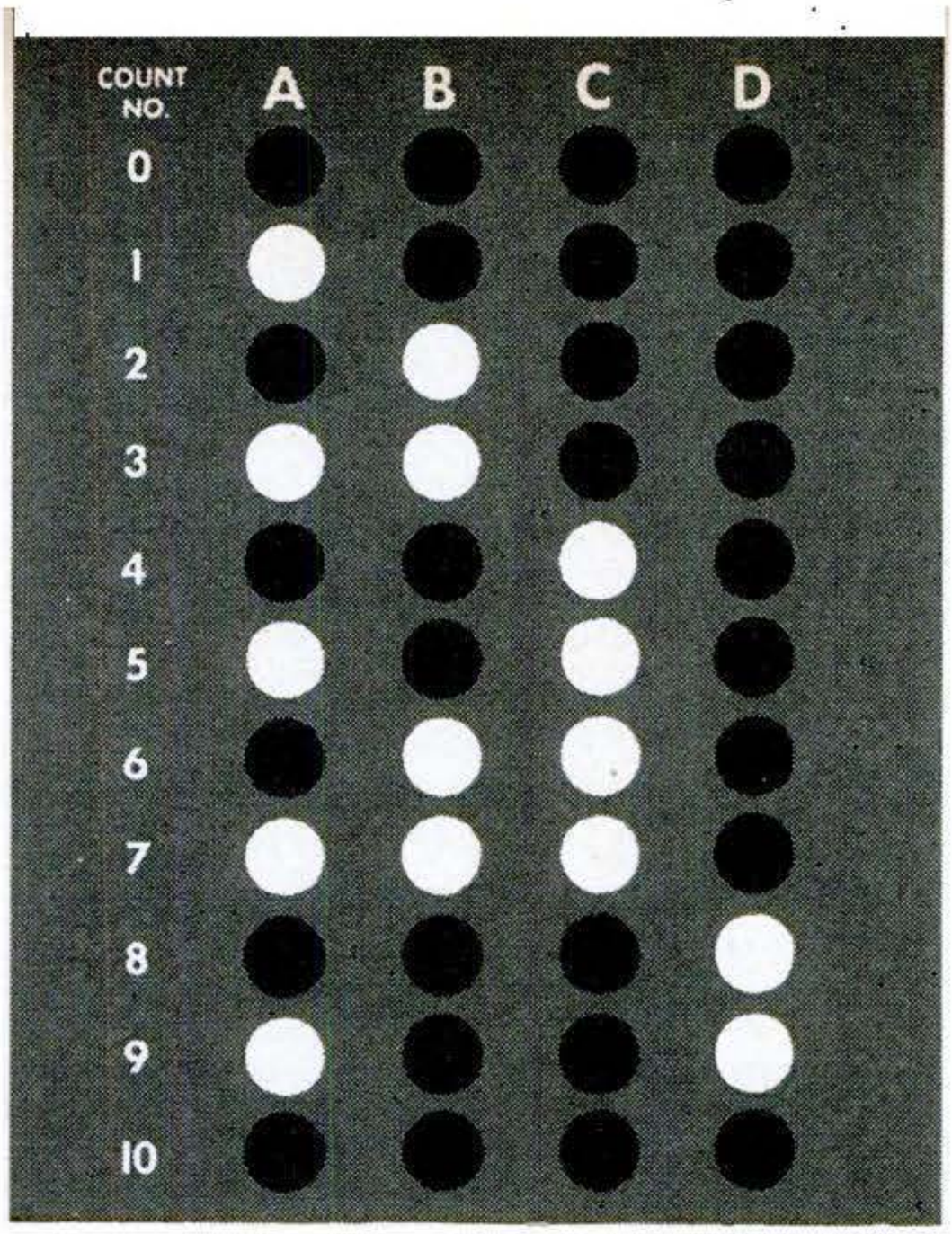
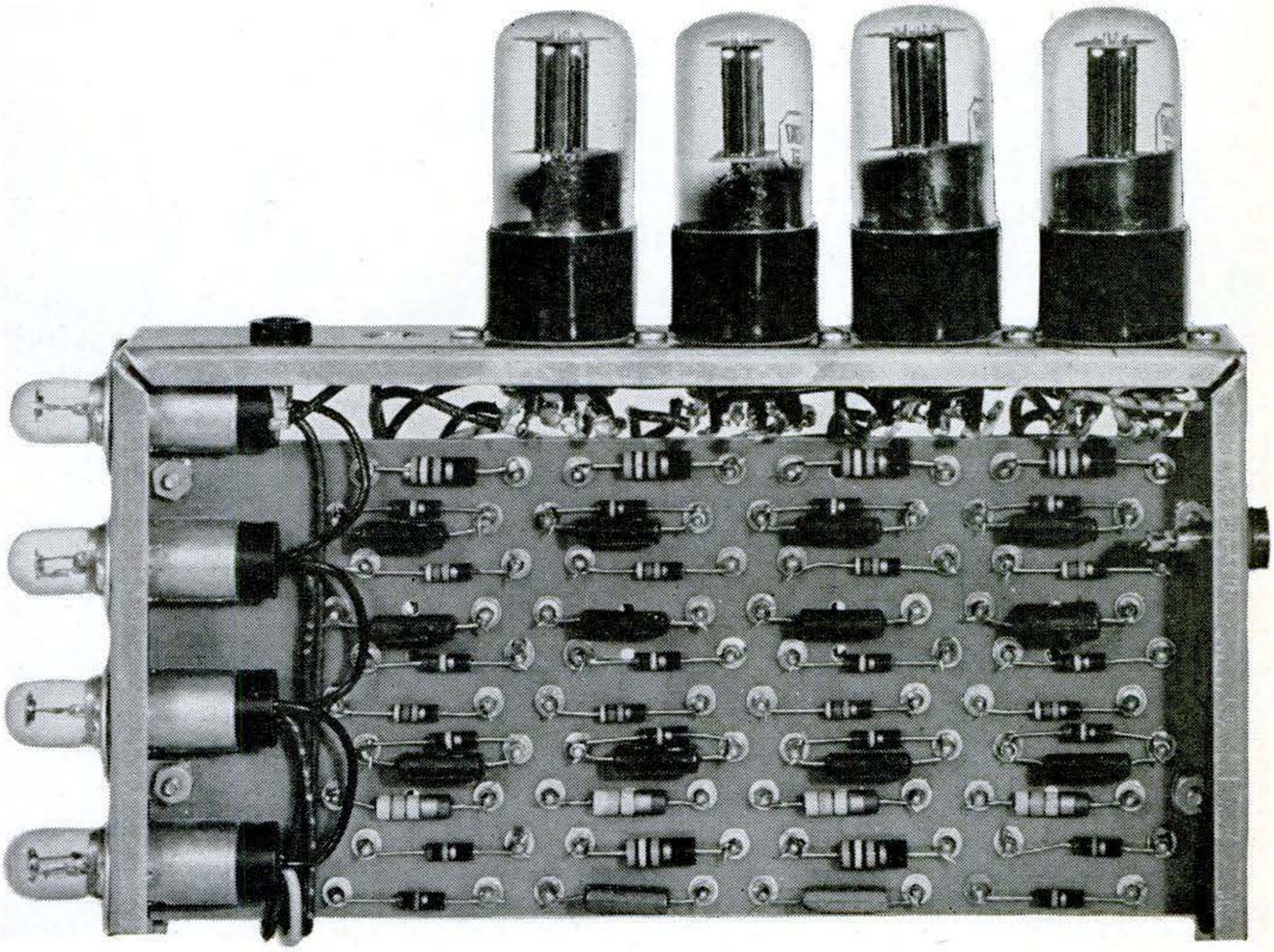


Diagram above shows how one unit of four lights can count to 10 with binary system. For zero, all four lights are off. Impulse one turns the first light on. Impulse two turns the first light off, second light on. Impulse three turns first light on again, leaves second light unchanged. Impulse four turns off both the first and second lights, turns third light on.

Counting a Million a Second

EVER try counting to a million? If you're very fast and go without rest or food, you might do it in four days. But there's a machine that can count to a million in *one second.* It could count all of the 140,000,000 people in the U. S. in three minutes.

Now being used for all sorts of jobs, from counting microscopic jewelers' screws to totalizing parimutuel bets at a race track, this electronic device was originally developed by the Potter Instrument Co., of Flushing, N. Y., to measure the muzzle velocity of artillery shells (by gauging the time a shell takes to fly between two photoelectric cells). It is a big jump ahead of the best mechanical



Four neon lamps on this decade unit enable operator to read number of impulses as registered by counter.

Copyrighted material

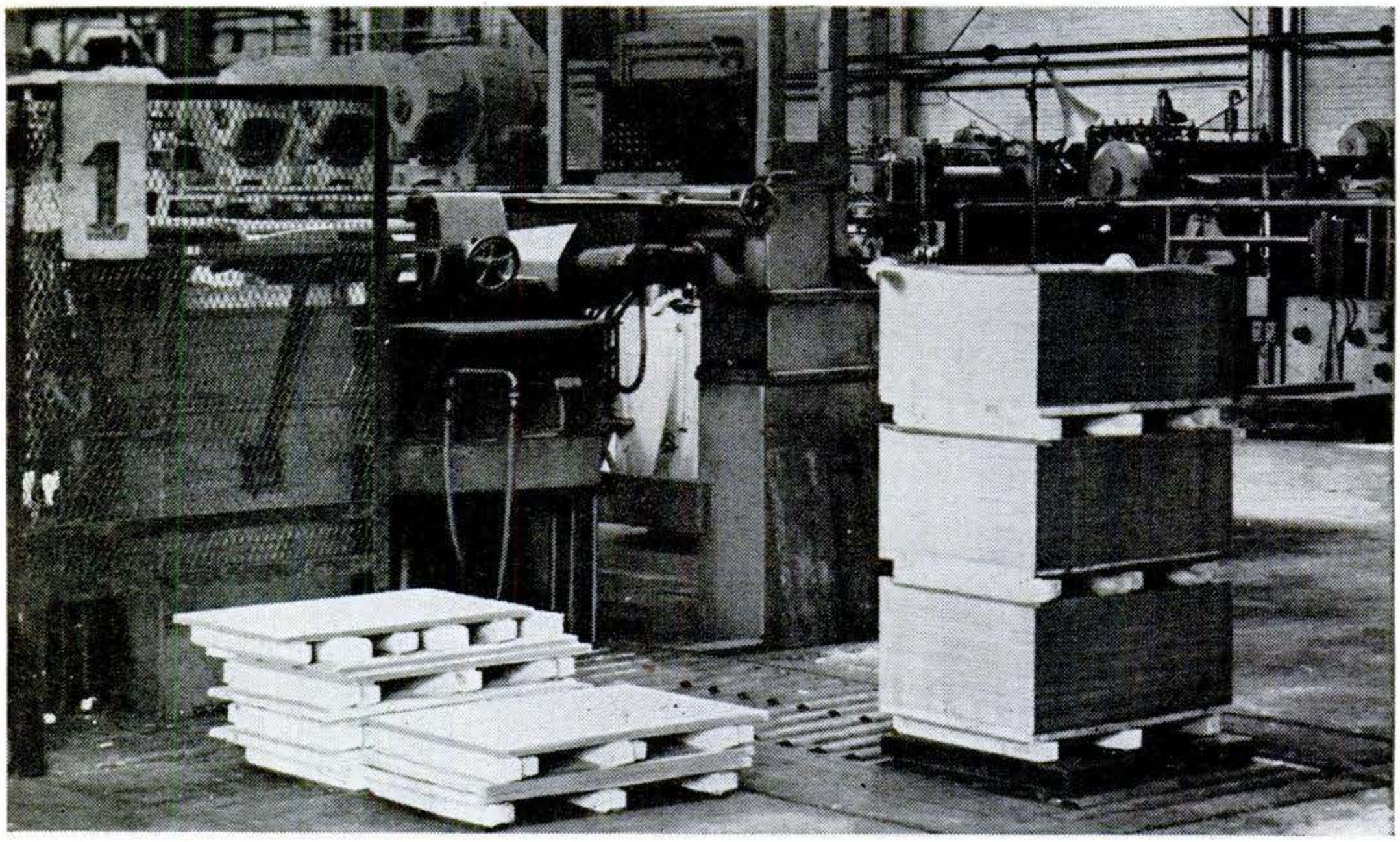
counters, which have a top speed of only 10 per second, and completely eliminates the wasteful method of counting small items by weighing them out in batches.

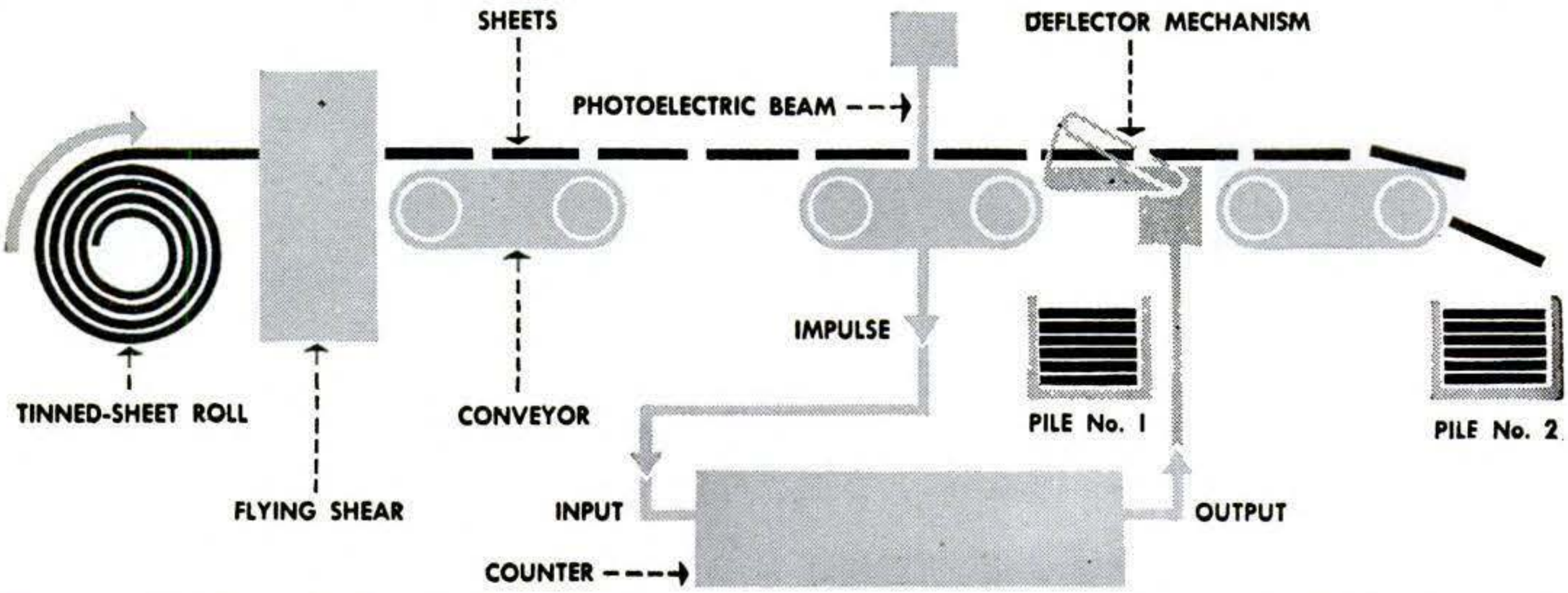
The basic element in this faster-than-human brain is the "decade," a unit tallying up to 10. Any total count can be obtained by hooking together enough decades.

Commercial models like one that tallies sheets of tin-plated steel have four decades and can count as high as 10,000. These machines are designed for only a fraction of the million-per-second speed attainable—usually about 250 per second. In the steel sheet counter, the sheets ride on a conveyor belt past a photoelectric cell and fall into a container. Pills, screws, bottle caps, or safety pins are counted in a similar fashion.

The Potter counter, like the ENIAC and RCA electronic computers, uses the binary system of counting by twos. Essentially it consists of a series of electronic switches (dual triode vacuum tubes) that turn small neon lights alternately off and on. Each successive electric impulse turns a switch (and its light) on if it was off and off if it was on. The impulse stops when it turns a switch on, keeps going to the next switch when it turns one off.

With this system, four switches could count up to 15. Each decade in a Potter counter has four switches, but is wired to stop at nine. The tenth impulse sets it back to zero and starts the next decade. END



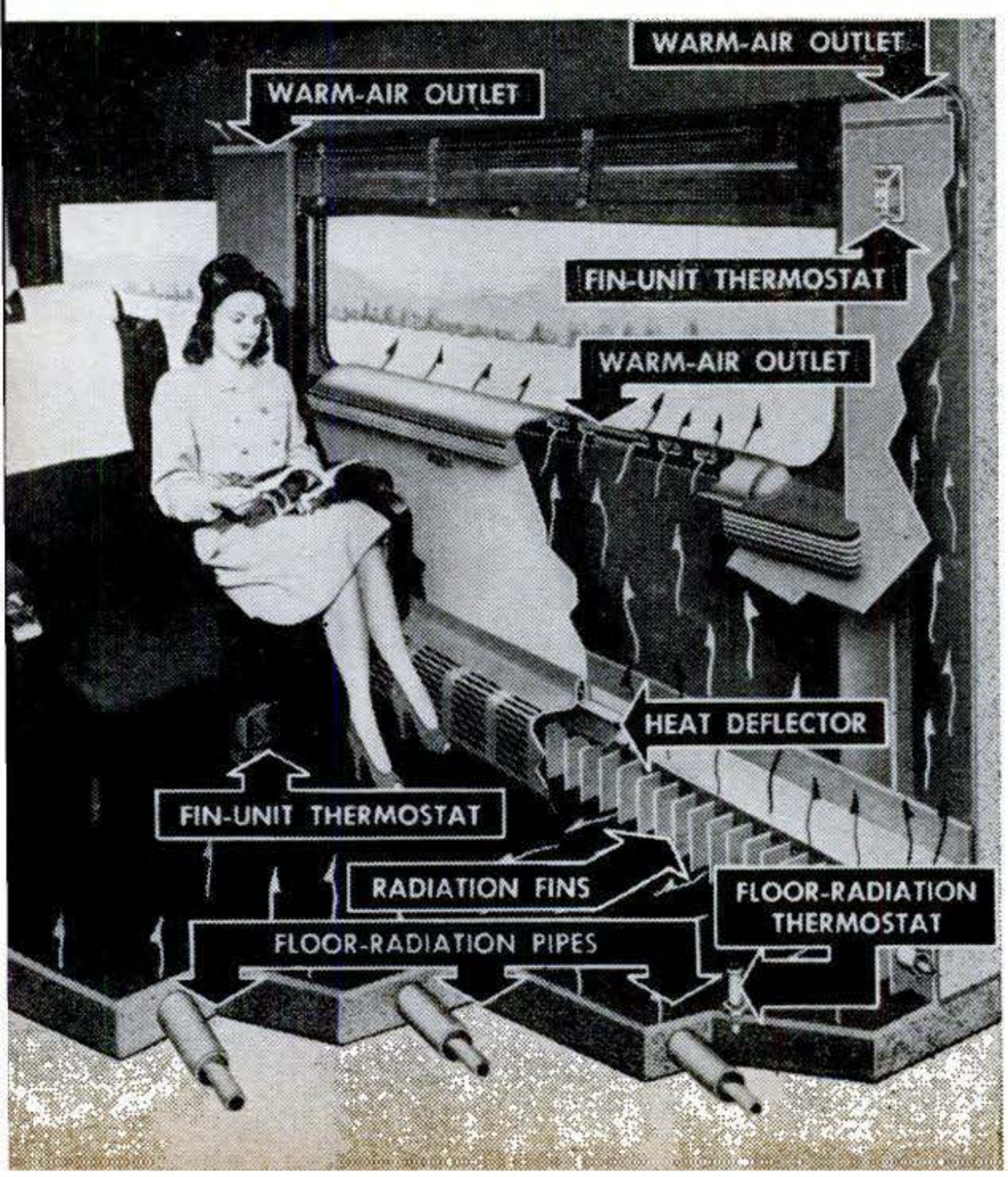


One application of the high-speed electronic counter is the automatic piling of tin-plated steel sheets. The diagram shows how this particular set-up provides stacks containing exactly the desired number of sheets. Although machine can count 10,000 sheets, piles of 100 can be handled by adjusting mechanism to start counting at 9,900. Quantity is selected by means of dial switches.

Copyrighted material

Giant Plow "Plants" Telephone Cable

THIS giant ditchdigger literally plows cable into the ground in a single operation. Used for the first time in laying the initial sections of a coaxial telephone cable that will eventually span the continent, the 27-ton monster (bottom photo) can rout out a ditch up to five feet in depth. Drawn by two or more 20-ton tractors (top photo), depending on soil conditions, its plowshare feeds the cable into the furrow it cuts.



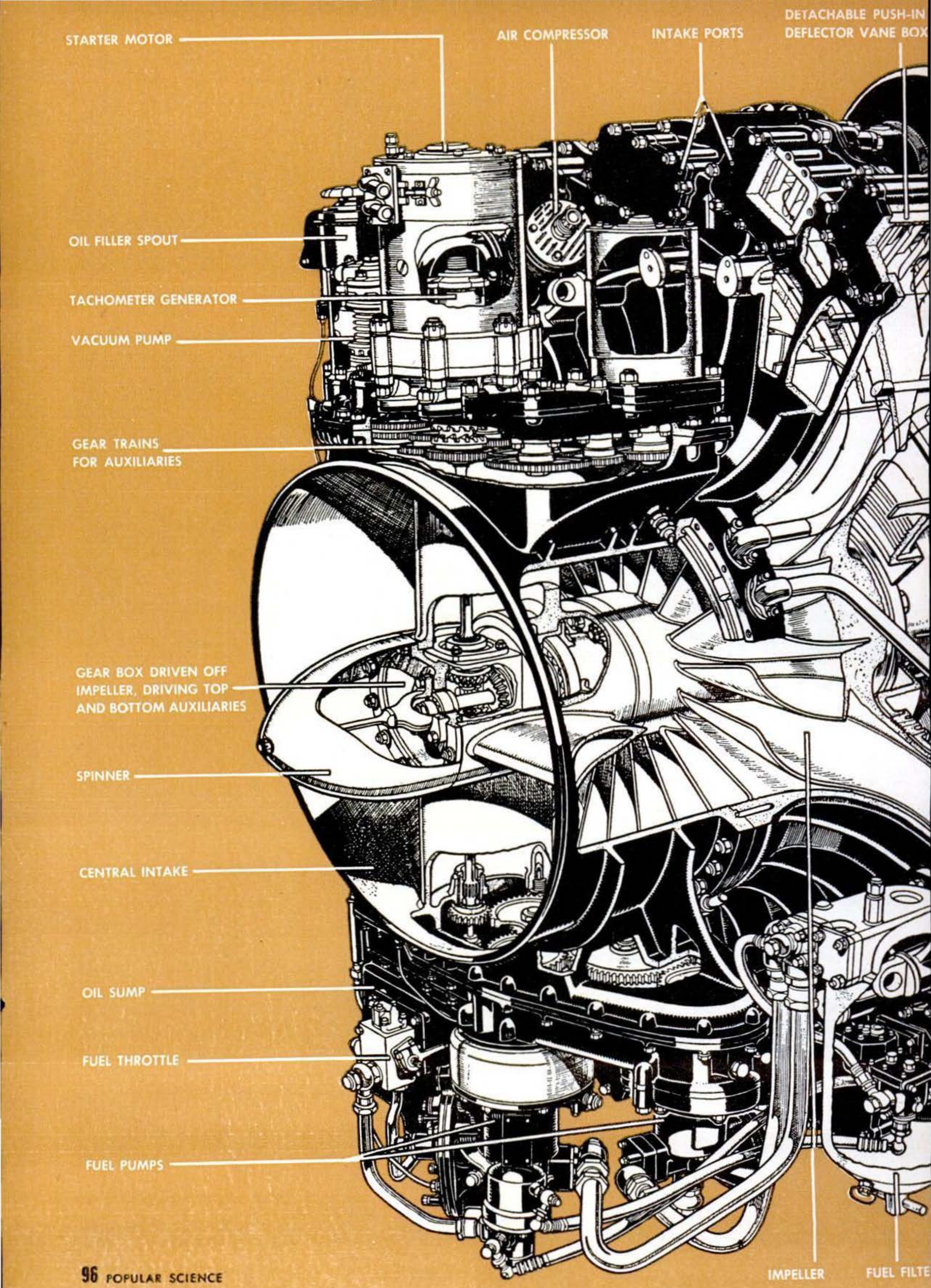
Two-way Heat Tested In Railroad Cars

EVEN and controlled heating at all times is the object of a heat-modulation system now being tested in railroad cars.

Principal source of heat in the new technique, called Rador, is a finned tube at the base of each wall. Steam, fed through an inner pipe at one end, is let into this tube at the other, condensing as it flows back and liberating heat through the fins.

Part of this heat is then discharged through wall ducts, above and below the window, and the rest at floor level. Finless floor units supply additional heat. Zoned thermostats keep a close control on the temperature at various points throughout the car.

Copyrighted material


STARTER MOTOR
AIR COMPRESSOR
INTAKE PORTS
DETACHABLE PUSH-IN DEFLECTOR VANE BOX
OIL FILLER SPOUT
TACHOMETER GENERATOR
VACUUM PUMP
GEAR TRAINS FOR AUXILIARIES
GEAR BOX DRIVEN OFF IMPELLER, DRIVING TOP AND BOTTOM AUXILIARIES
SPINNER
CENTRAL INTAKE
OIL SUMP
FUEL THROTTLE
FUEL PUMPS
IMPELLER
FUEL FILTE

The "Ghost" Goes to Work

TWIN ENTRY TO COMBUSTION CHAMBER

TEN COMBUSTION CHAMBER UNITS

STARTER UNIT

JET TUBE

REACTION CONE ("BULLET")

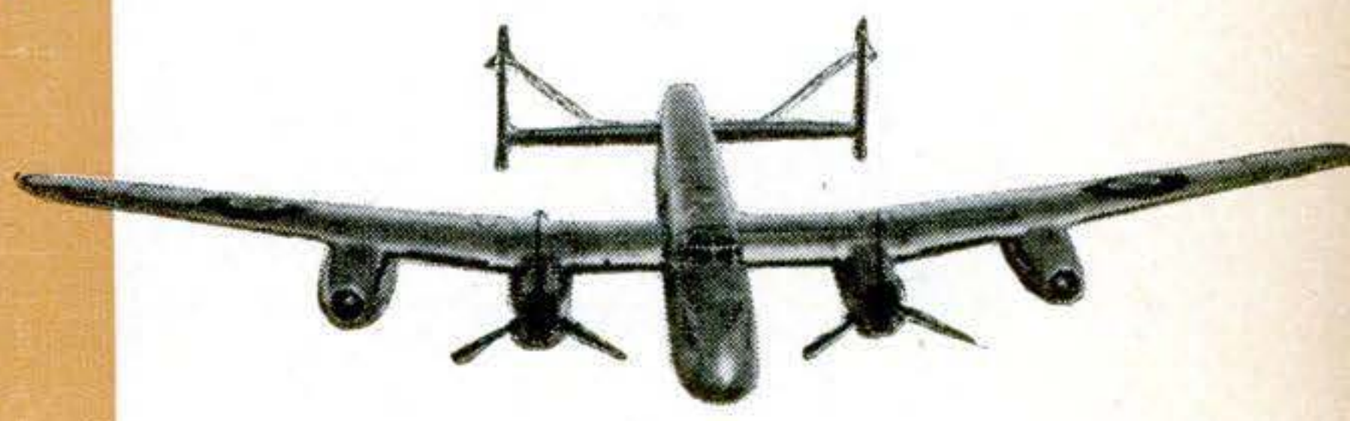
PRIMARY AND SECONDARY AIR FLOWS BETWEEN COMBUSTION CHAMBERS

SUPPLY RING WITH BRANCH PIPES TO BURNERS

PELLER-TO-TURBINE SHAFT

CUTAWAY COURTESY *THE AEROPLANE*, ENGLAND

FOUR years after design was begun on its prototype, the British De Havilland Ghost is finally going to work. Developing a thrust of 5,000 pounds to rate as one of the world's most powerful jets, it is being installed on both the Lancastrian and the Vampire. The Ghost is adaptable to many types of aircraft. Its power, at 600 m.p.h. at sea level, corresponds to 12,000 horsepower from a reciprocating engine driving a propeller.

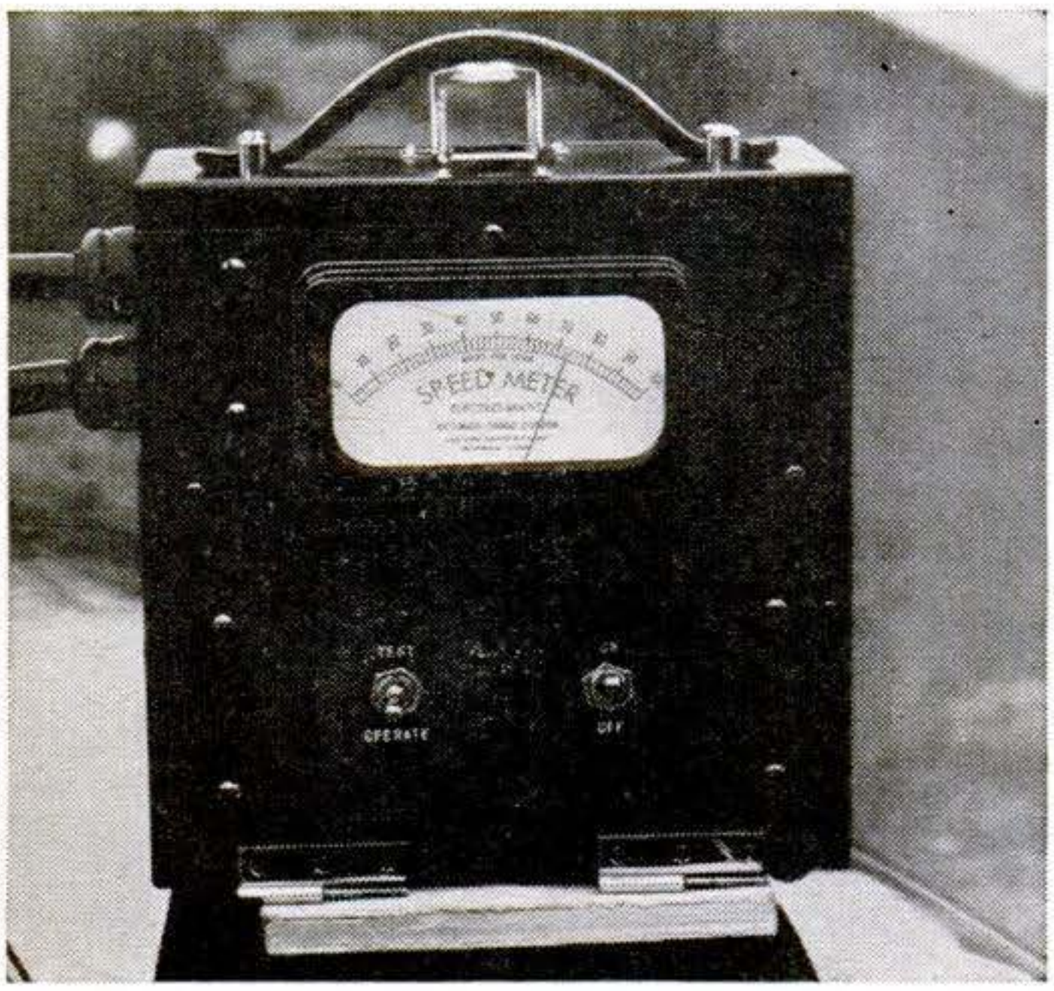


For long-range and endurance trials, Ghost jets are being put in Avro Lancastrian's outboard nacelles.

Copyrighted material

Radar Clocks the Traffic

A Connecticut state policeman, running a test for PSM, clocks a car on the Merritt Parkway. With the meter in plain view, motorists were suspicious; all slowed down. Arrow indicates bounced signal.



Indicator, one of the meter's three compact units, has a range from zero to 100 m.p.h. The needle holds a position on the dial long enough for an accurate reading to be taken, visually or electrically.

The transmitter-receiver contains an oscillator and generates 1/10 watt at 2,455 mc. At its maximum operating distance, about 150 feet, the transmitter sprays microwaves in a pattern 30 feet wide.

Copyrighted material

You may not see the little black box beside the road, but its microwaves will tell just how fast you're going.

By Devon Francis

IF YOU spot a highway patrolman hovering over a little black box alongside the road the next time you go motoring, it may mean your car is being clocked by radar. But you may not be able to spot the box or the cop—the apparatus is so compact that a bush will hide it, and it can be manipulated by remote control.

The Electro-Matic Speed Meter is something new and versatile in speed measurement. With it, maximum safe speeds on U. S. highways can be determined. It can tell, too, just how fast a railroad train can take a curve of any given radius.

Heretofore, it has been necessary to stretch wires or tubes across a highway to clock the speed of a car. The elapsed time between two points was obtained by stop watch or electronically, and the speed was read from a conversion chart. A variation of the system was the use of "electric eyes."

Microwaves Do the Work

The Speed Meter, developed and manufactured by the Automatic Signal Division, Eastern Industries, Inc., of East Norwalk, Conn., shoots microwaves at an oncoming or retreating car, and the speed is read directly off a dial.

In its timing, the device works on the principle that a radio wave reflected from a moving target will cause a shift in the reflected wave length proportional to the speed of the target. This shift is shown on the meter in miles per hour.

The meter was designed primarily as a highway engineer's tool. An obvious application is in determining safe speeds on the hundreds of thousands of curves on highways, and at intersections. Test cars equipped with airplane ball-and-bank indicators, already in use by many state highway organizations, can be clocked for maximum safe speeds. Here the meter is invaluable because it is accurate within two percent of a true speed, while auto speedometers may err as much as 15 m.p.h. on the high side in the higher speed ranges.

Court Approval a Question

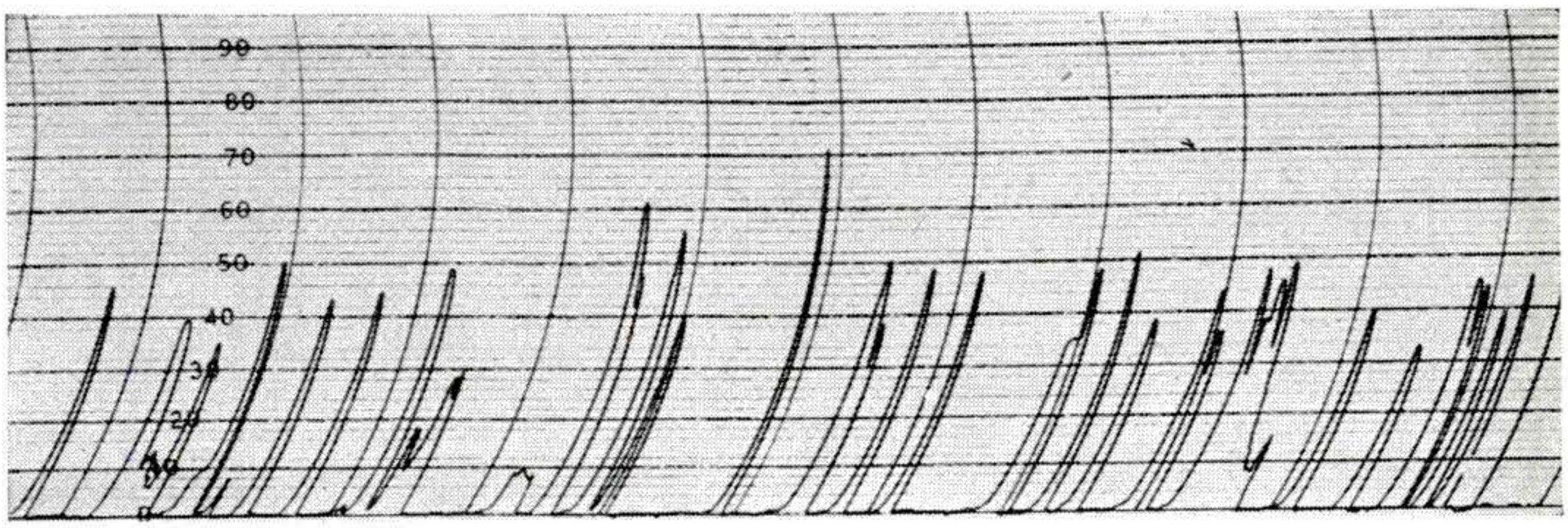
The meter also could be used to catch speeders, although the manufacturer does not emphasize that. It has not yet been determined whether a traffic court would accept such microwave evidence.

The meter can be built to measure aircraft speeds, too, up to 1,000 m.p.h. or more, but its margin of error would introduce a possible inaccuracy of 20 m.p.h.

Using it requires little or no practice, but an operator must realize that his dial will register on the biggest target or the fastest car in heavy traffic. Practical application led to desensitizing the microwave pickup. Experimental models gave readings on cars a half mile away as well as those near by. The needle on the dial went crazy.

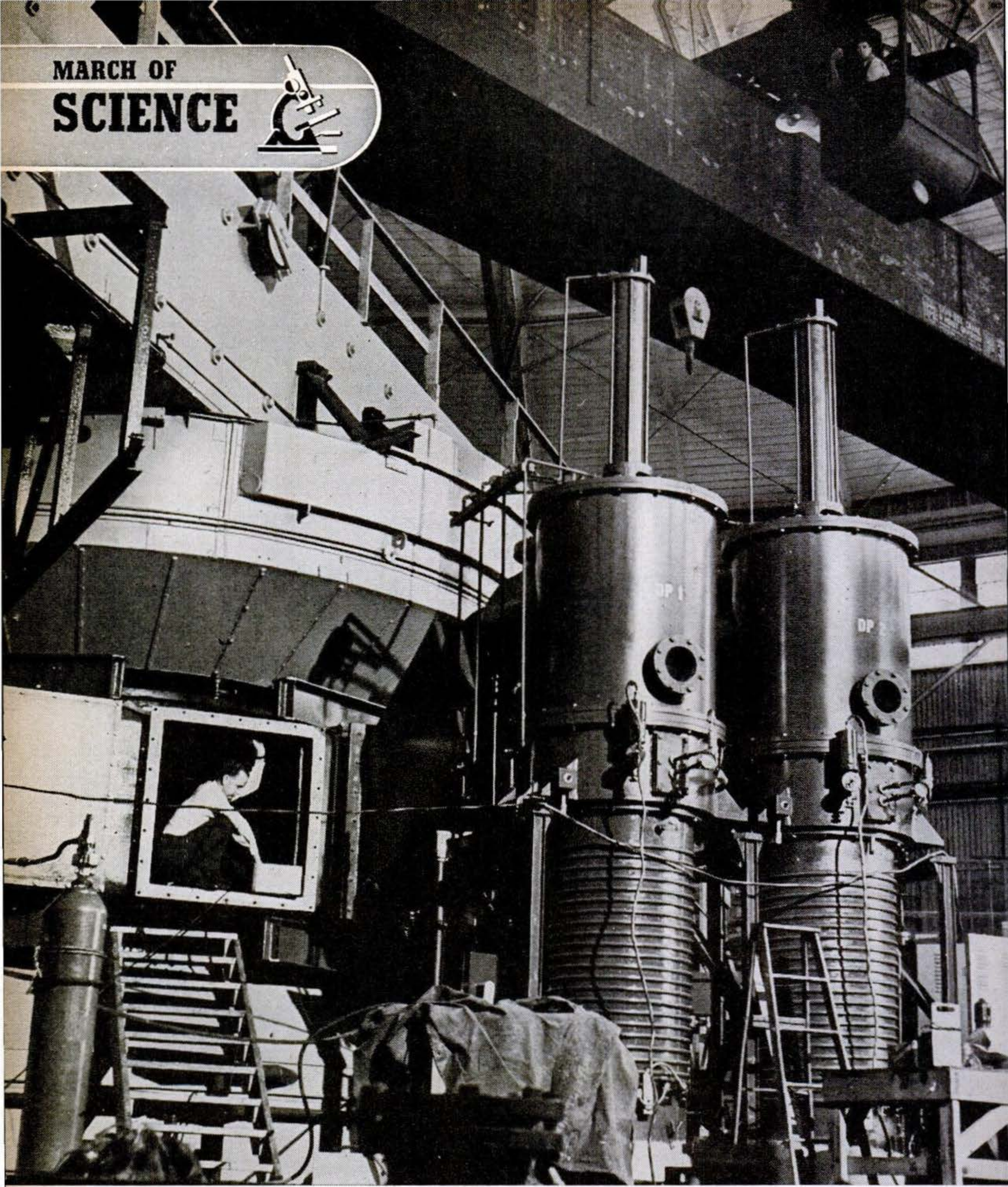
The meter has been undergoing tests for several months with the co-operation of Connecticut's Commissioners of State Police, Highways and Motor Vehicles. END

PSM photos by W. W. Morris



A permanent record of highway speeds can be obtained by transmitting the dial reading to a graphic recorder. Fluctuations during test show how needle repeatedly shot from zero to a car's speed; 70 m.p.h. reading in center was made by a state police car. One man can operate the speed meter, which weighs only 45 pounds complete. An FCC license is required, but not an operator's license.

Copyrighted material

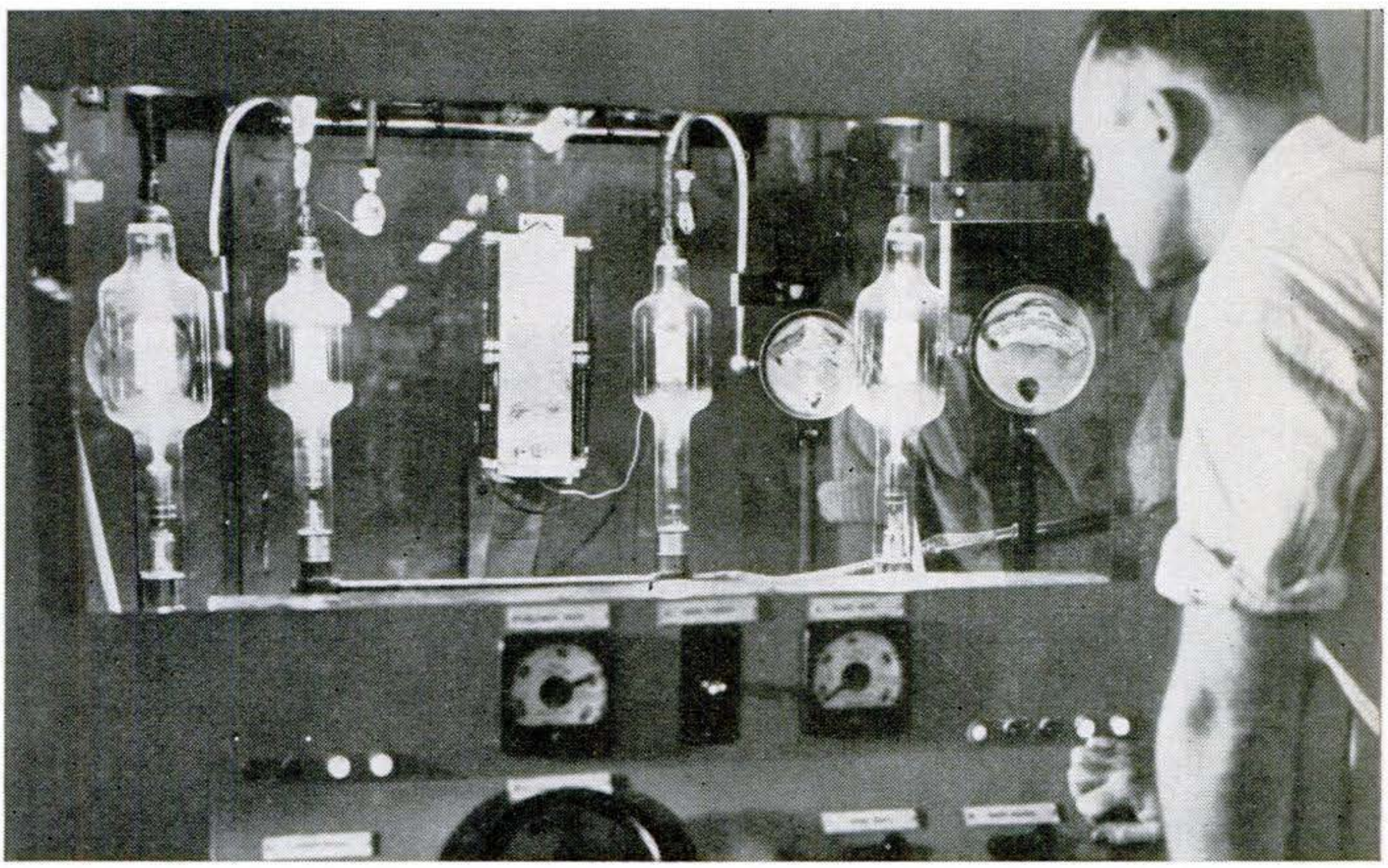


Spearhead of Research. The first 200,000,000-electron-volt deuterons ever made by man have been produced by this 184-inch cyclotron at the University of California, shown undergoing repairs. The technician at lower left is working inside the vacuum acceleration chamber, between the giant magnet's poles, while the crane operator at upper right maneuvers his hook into position. The two huge cylinders on the right of the acceleration chamber are the cyclotron's high-vacuum diffusion pumps.

Copyrighted material

Tracers Trailed. Here Geiger counter tracks radioactive elements in patient on X-ray table. Doctors hope to find how cells of cancerous tissue form by following substances the body uses. Nearly any substance can now be made radioactive.

Looking into Steel. The internal structure of steel can be similarly checked by tracing radioactive carbon. This researcher is using a counter and photographic plate. Movement of carbon through steel is believed to make metal "age," grow brittle.

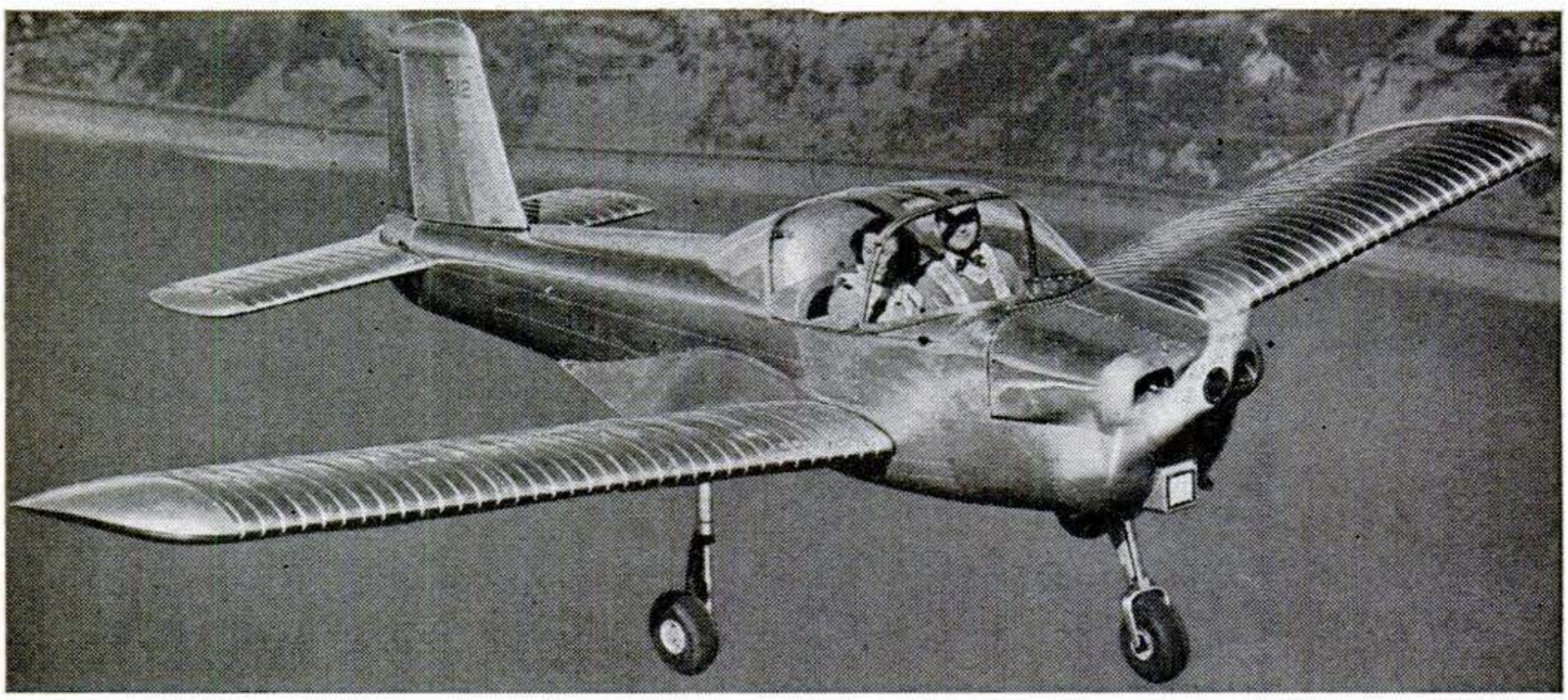


Uranium Catchers. These high-voltage kenotron tubes, shown under test at the General Electric plant in Schenectady, N.Y., play an important part in the development of atomic energy. They are used in the electromagnetic plant at Oak Ridge, Tenn., for the concentration of uranium. Kenotrons also have many industrial applications, such as the electrostatic precipitation techniques used for dust collection, gasoline cracking, painting and enameling, and in the manufacture of sandpaper and textiles.

Copyrighted material

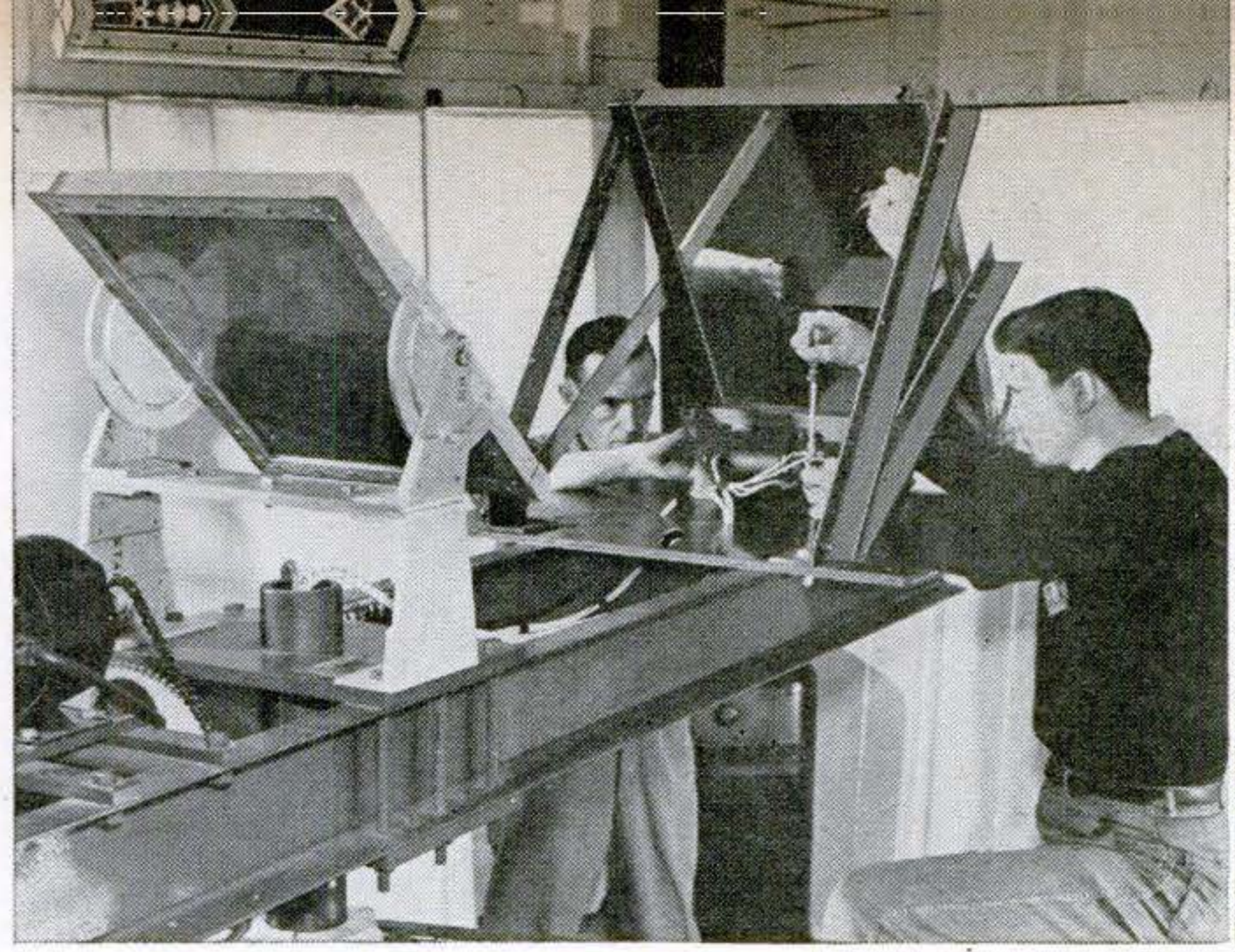
Navy's Fastest Fighter. A new GE jet gives North American's FJ-1 better than 500 m.p.h. to make it the Navy's fastest fighter—and the only U. S. one with a straight ram duct in the nose. Built for carriers, its range equals present types.

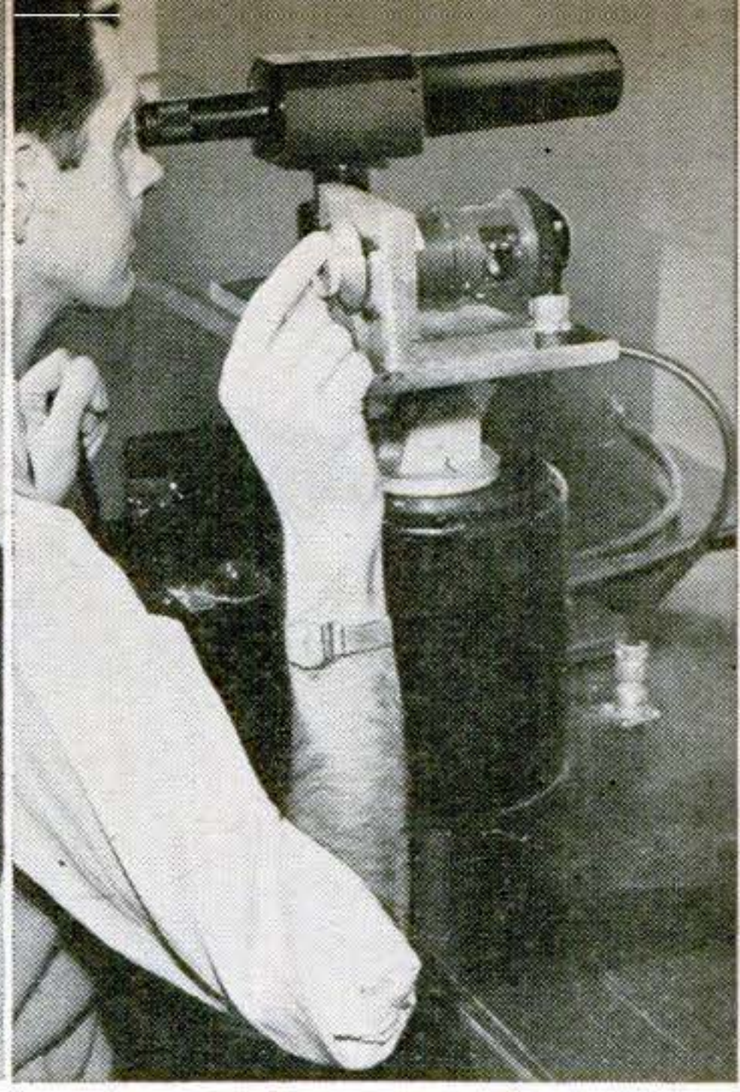
Service Station on Wheels. This mobile fuel servicing unit for large airports pumps its gas through hydrant valve connections of an underground pipe line. A hydraulic hoist lifts the fueling crew and hoses on a four-foot-square platform to any height up to 15 feet. The servicer is self-propelled and can deliver 150 gallons a minute through each of its two hoses. Lubricating oil is carried in a 200-gallon container, and a compartment is provided for storing hydraulic oils, greases and other special products for the maintenance of aircraft.



Flying Lightweight. Weighing only 1,050 lb. with full tanks, Thorp Aircraft's two-place Sky Skooter cruises at 100 m.p.h., has a 400-mile range. Powered by a 65-hp. Continental engine, it is 18 feet long and its wing span is 25 feet.

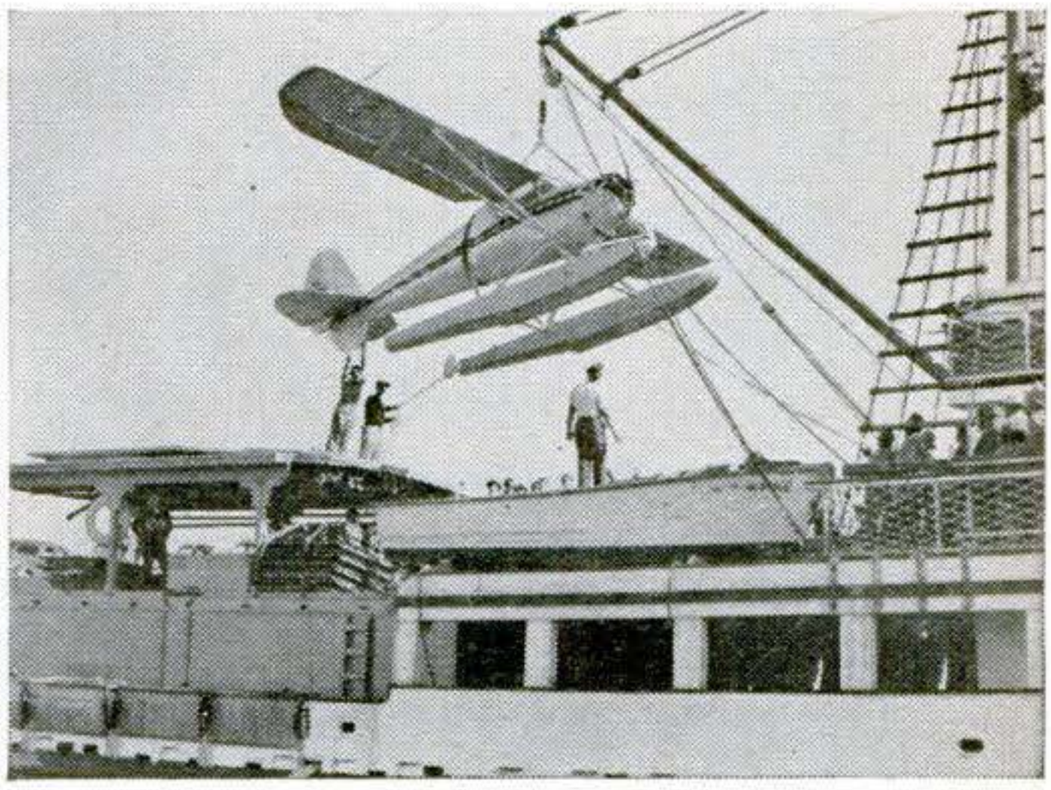
Copyrighted material



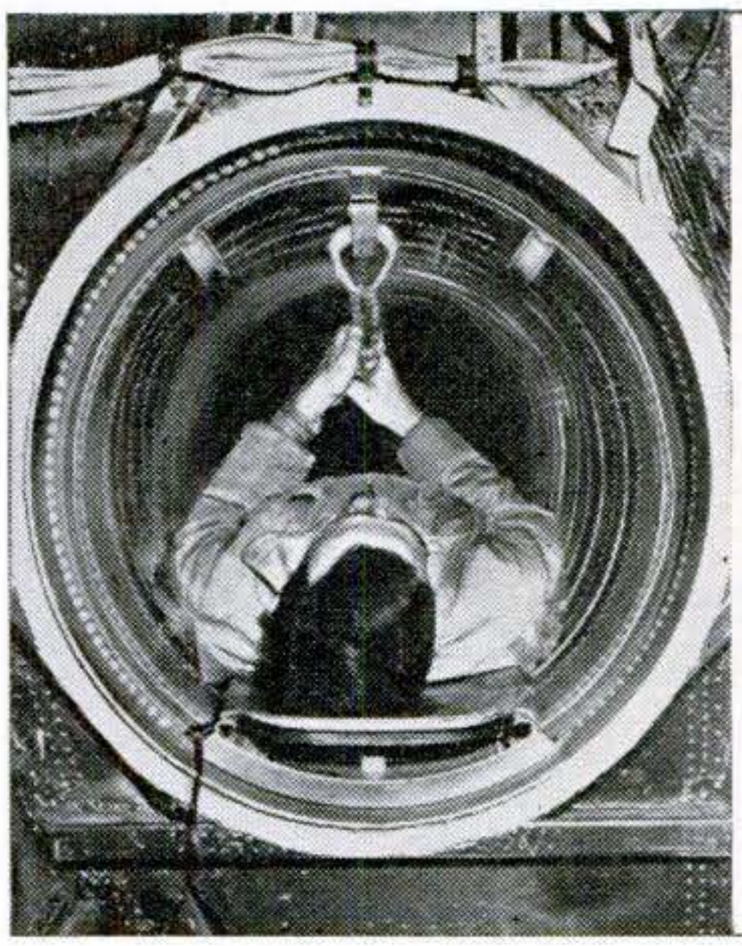


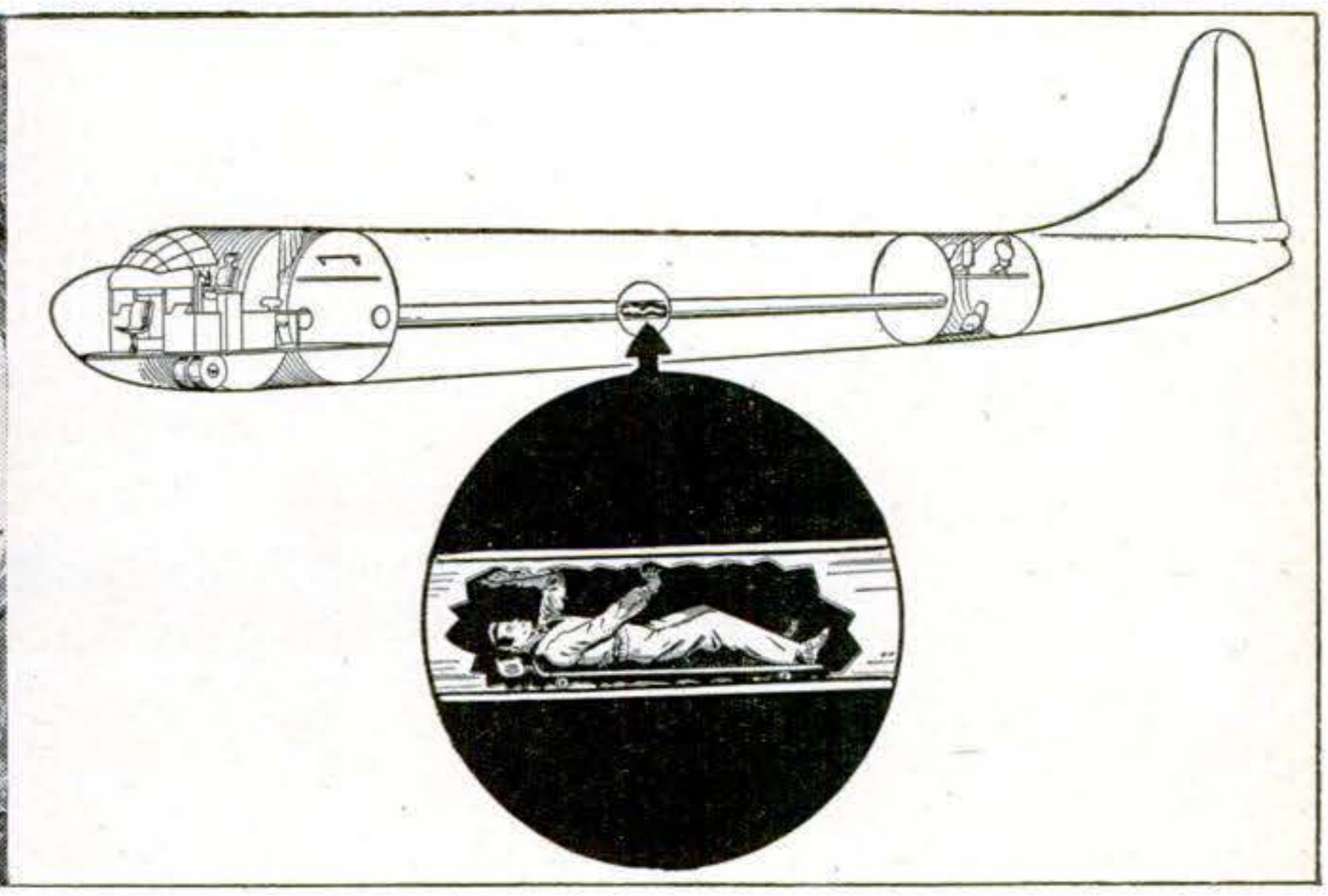
Motor Merry-go-round. A whirl at 200 r.p.m. in this centrifuge gives a small motor a workout at 50 G. Mirrors reflect the motor's image back to center and eventually to the telescope, at right, synchronized so motor appears to stand still for study.

WHAT'S NEW in AVIATION



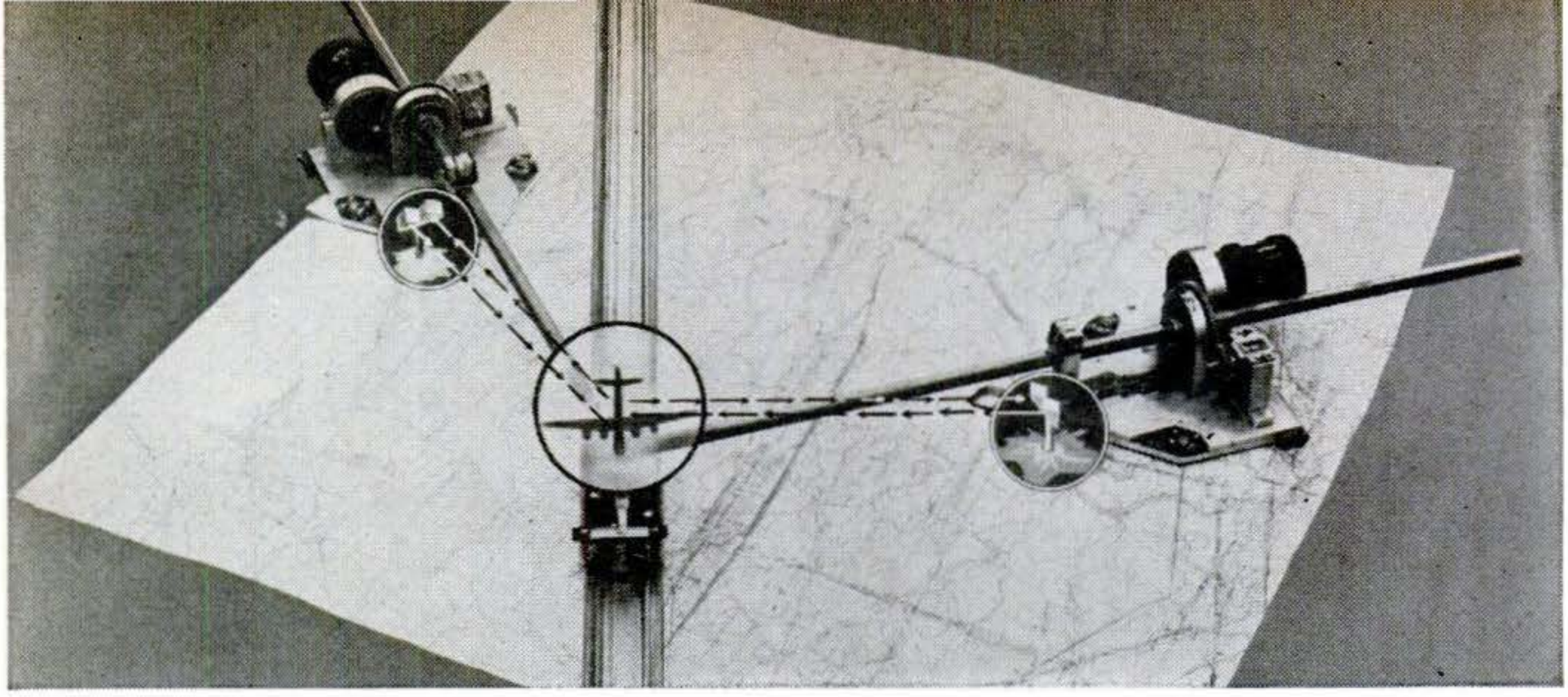
Finding Fish by Air. Air-minded Southern California fishermen are using a Luscombe monoplane to find more tuna quicker. Fitted with floats, the plane rides to the fishing grounds in the boat's bait tank and is boom-lowered into the water.





Flying Subway. A miniature 85-foot "subway" is the only connection between the forward and aft cabins of the AAF's giant B-36. Lying on his back on a four-wheel scooter, a crew member must pull himself through the tunnel by a cable.

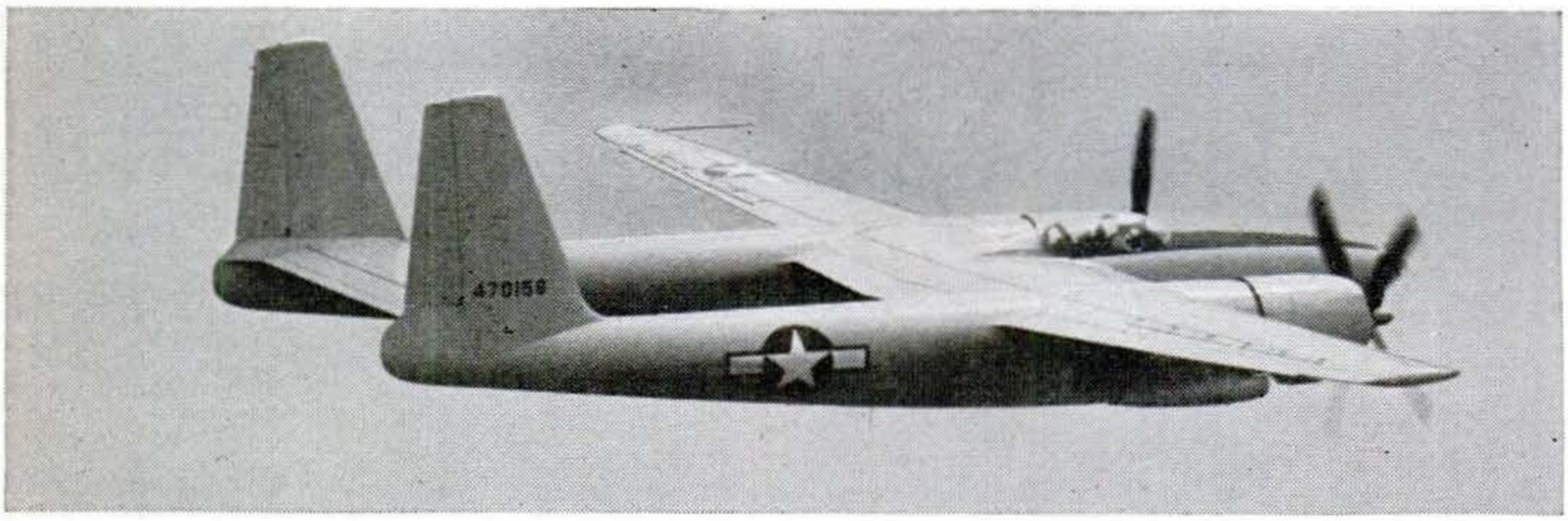
Copyrighted material



On the Straight and Narrow. This shoran indicator, used for mapping, helps keep a plane within 250 feet of the proper ground track. Radio pulses are sent to two fixed points; echo times give distances, translated into length of two geared rods. Where these cross, a pointer marks plane's position and moves along desired course. If plane drift off, one rod shortens, pulls off pointer, and a dial needle moves.

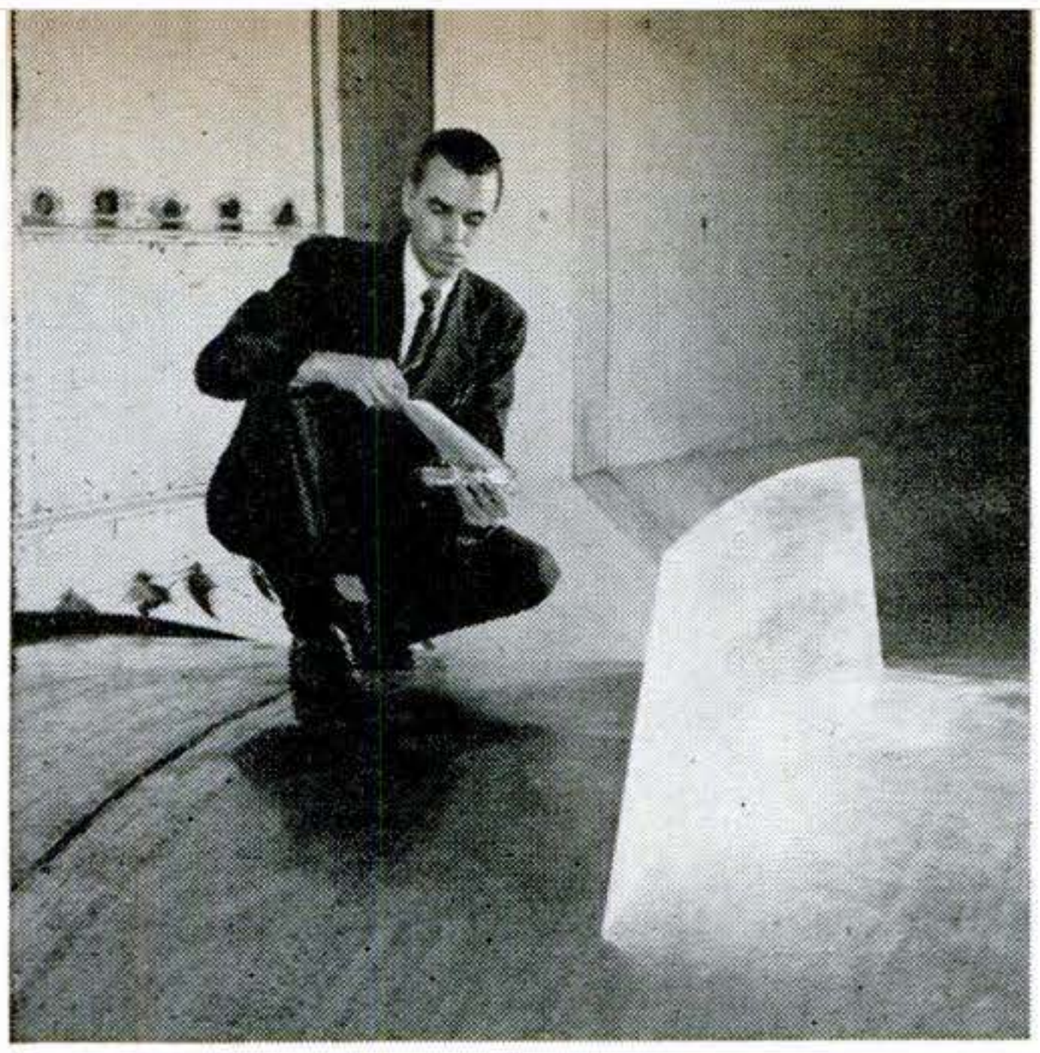
WHAT'S NEW in AVIATION

Periscope Avigation. A new combined periscope-sextant may eliminate the astrodome used by air navigators. The observer stays within the cabin; only 1½ inches of the instrument protrudes. Dome removal would end chance of collapse, cut down drag and simplify sighting. Square D Co. developed the sextant for the Army.

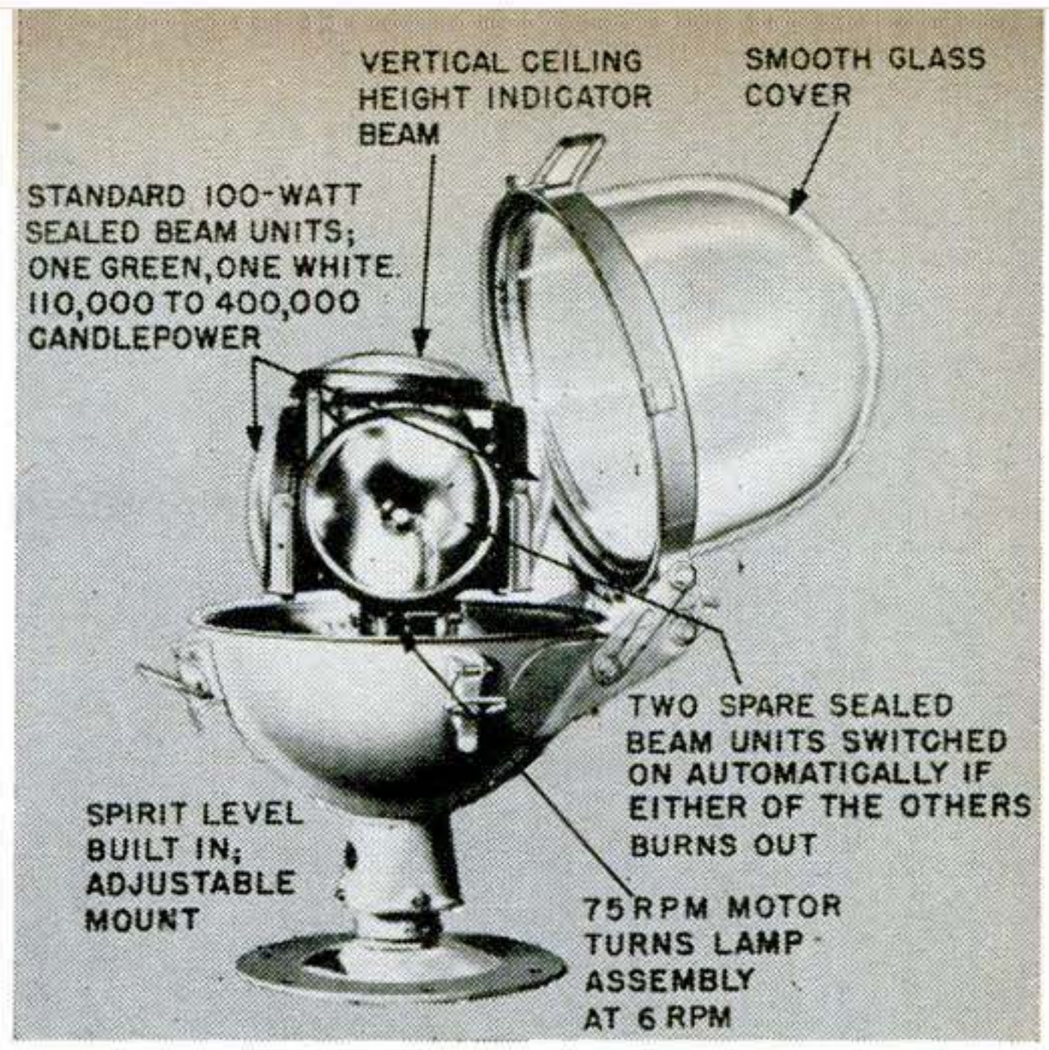


In the Air Again. Howard Hughes is at the controls of this XF-11 photo plane, a duplicate of the one in which he narrowly escaped death when it crashed last July. The XF-11, designed for the Army Air Forces, is intended for high-speed, very long range photographic reconnaissance. Here Hughes is testing it at 6,000 feet.

Copyrighted material

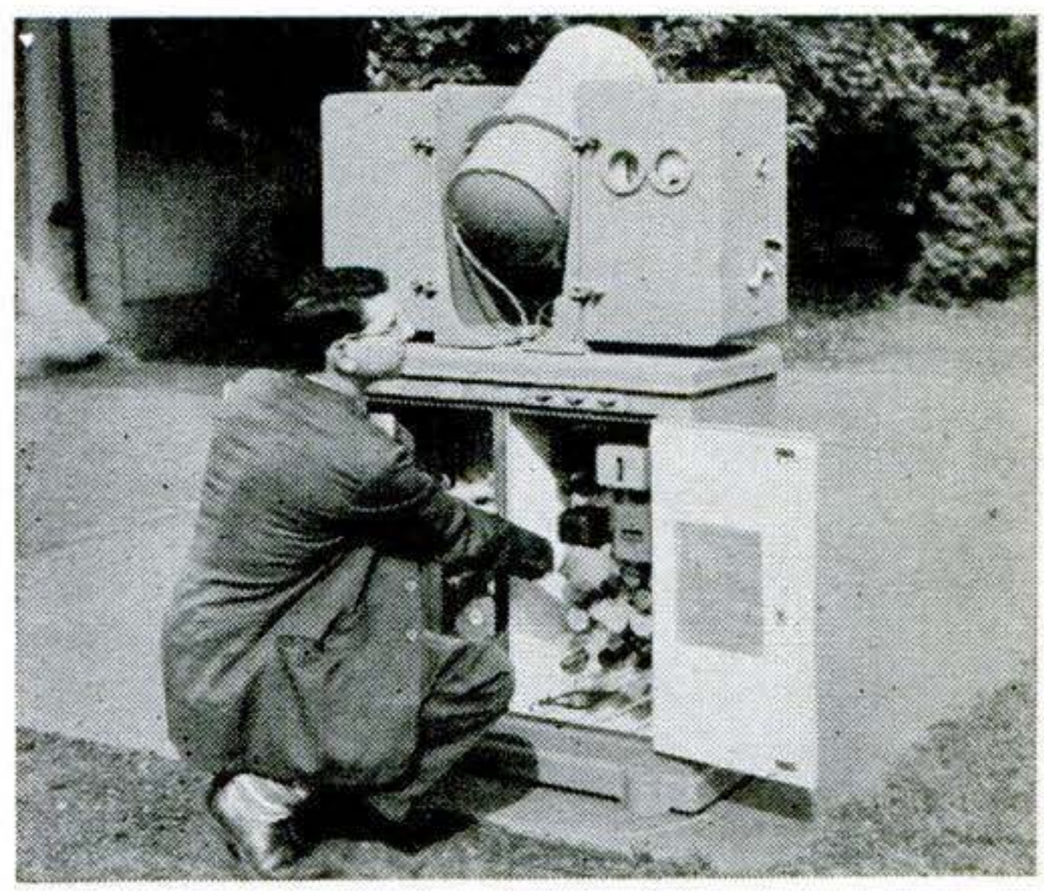


Bump Speeds Air Flow. A two-foot-thick aluminum bump, installed in a wind tunnel by Lockheed engineers, speeds air flowing around models by 150 m.p.h., permits tests at velocities up to 850 m.p.h.



Lightweight Beacon. Designed to meet the requirements of small airports, this low-cost rotating beacon is easily installed on poles or roof-tops. It is made by the Line Material Company.

Light Analyzes Clouds. Used at Army and Navy airfields to measure cloud heights and relative densities automatically, 125 ceilometers like the one pictured at right are being manufactured by General Electric. A pulsating light device throws a vertical beam into the sky to scan the clouds. A detector unit, placed 1,000 feet from the projector, records the "scatter energy" of cloud layers dense enough to reflect and scatter the beam, and gives accurate information on the distance between cloud banks and the ground. Both height and density readings are transmitted to an automatic recording device.

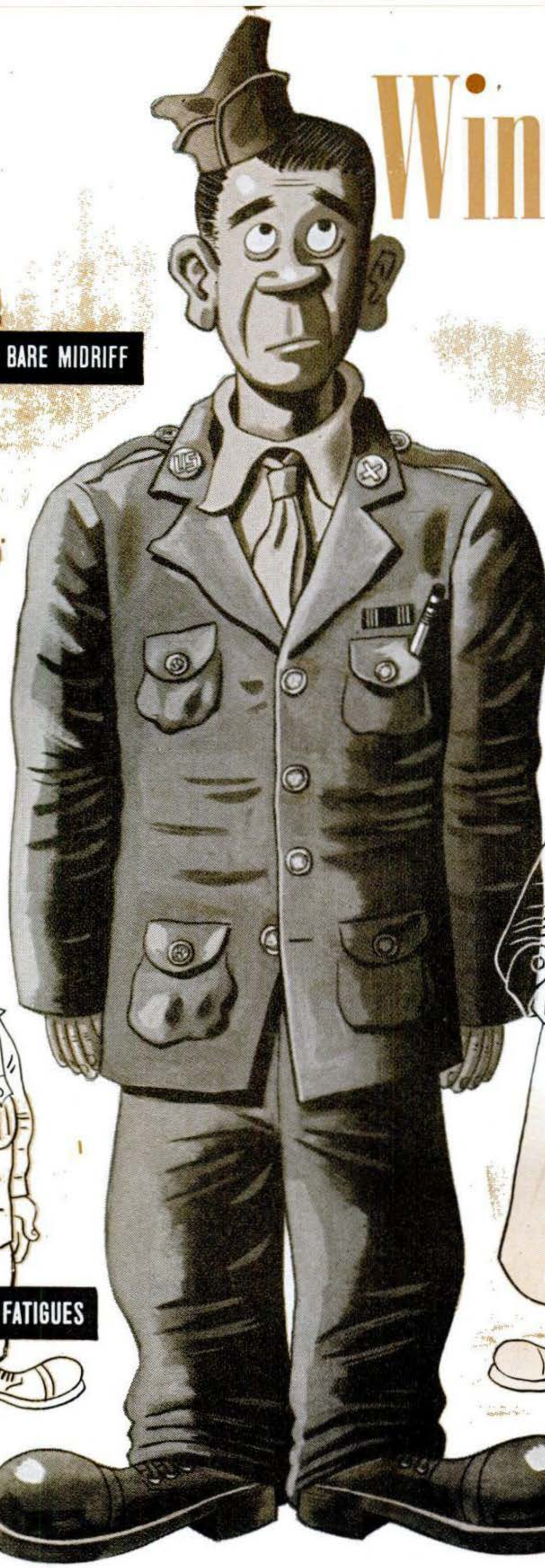


Six-Jet Giant. Now undergoing tests for the AAF, Martin's six-jet XB-48 is the largest craft of its type yet built. It has a span of 108 feet 4 inches and is 85 feet 9 inches long. "Bicycle" main landing wheels, set tandem below the fuselage, are supplemented by small wing wheels for stability on the ground.

Copyrighted material

Winning

THE BARE MIDRIFF



THE TIRED FATIGUES

THE OVERWEIGHT OVERCOAT

Copyrighted material

the War on Uniforms

By Leon Shloss and Irving R. Dickman
PSM WASHINGTON EDITOR EX-S/SGT., 26TH INF. DIV., 3RD ARMY

Sketches by Syd Landi
EX-SGT., ANTIAIRCRAFT COMMAND

THE GIs who had to fight bugs, mildew, trench foot and their uniforms, as well as the enemy, will be surprised to learn that, at long last, "something is going to be done about it." Not too quickly, of course; the Army doesn't do things that way. But by mid-1949 the overcoat that doubled its weight in the wet, the raincoat that kept rain out like a sieve, and the overseas cap that kept nothing off a guy's head except a real hat will have their final discharge. Even trench foot and mildew, already staggering, may be licked.

Beginning July 1, 1949, the cotton cap with visor and a combination raincoat-overcoat with detachable wool lining will be part of the standard uniform for officers and enlisted men alike. In addition, War Department Circular #61 calls for general use of many items that began to appear late in World War II.

The New Uniform

From head to toe, the GI stationed in a emperate zone will wear something like this:

The visor cap; wool OD or cotton suntan shirt; wool OD trousers; high-neck sweater; Eisenhower jacket; wool socks with cushion sole; combat boots with composition sole; leather gloves with wool inserts; the new field coat.

For field wear, the success of the combat jacket under wartime conditions has led to the designing of a complete uniform, wind-resistant and water-repellent, including hood, jacket and trousers. Designed for wear over the basic clothing, when necessary, the jacket and trousers are to have pockets enough for even the most loaded GI.

These garments, with the summer suntans and fatigues, either coverall or shirt-and-trousers, are expected to give the soldier both comfort and protection for all normal conditions. Basis for the changes already made, and those to follow, is experience in the field during World War II, which opened many a tradition-bound eye. The Office of the Quartermaster General (OQMG) remembers all too painfully how men in every area left behind what was useless or unnecessary.

Eyes were opened, too, by the way GIs voted for their favorite uniforms by the simple method of "liberating," or appropriating, certain items. Few Americans in the ETO, for example, resisted the temptation to get hold of the warm, durable Armored Force jacket and pants when they could.

This display of soldier opinion, more than anything else, led to changes in the GI equipment in the midst of the fighting and is responsible for the continuing research for new and better clothing.

Of course, not all Army traditions have been broken, but the replacement of such items as the wool overcoat, the raincoat, leggings and overseas cap will be welcome to most GIs. And enlisted men will undoubtedly acclaim the elimination of special uniforms for officers.

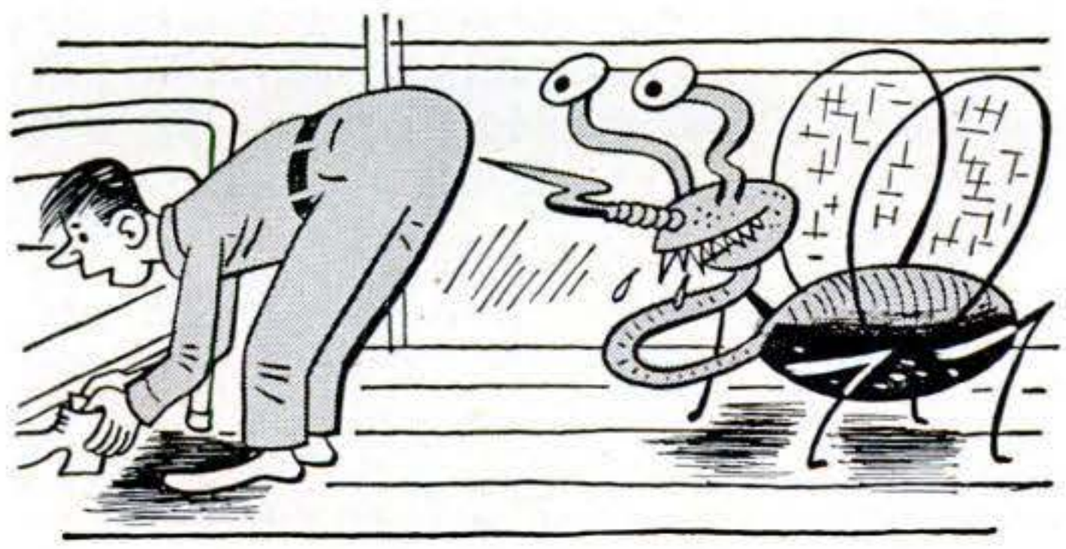
But to the OQMG experimenters at Philadelphia and Lawrence, Mass., even more important than their work on the regulation uniform is the development of clothing to meet new American responsibilities all over the globe, with special problems of frigid and tropical climates. The

Copyrighted material

One major change in the basic uniform will be the Eisenhower jacket, cut long enough to eliminate the break at the waist. Pocket space remains scanty, and low-cut shoes for dress wear won't be "issue."

OQMG remembers the Bulge, where trench foot put even more men out of action than enemy fire, and the Pacific campaigns where men had to fight mildew, mold and insects.

Of the special problems, most difficult to solve is that of keeping the body warm and capable of movement in the subzero temperatures of the Arctic and Antarctic. For each degree of temperature below zero, a man must use two percent of his energy just to keep warm. At -50°, all a man's time and energy would be occupied in staying alive. In last winter's Operation Frigid, however, it was discovered that cold of -60° is the rule, rather than the exception.



To meet these conditions, experiments are now testing the "layer principle" developed by Paul Siple, of Army QM, who has spent more time in the Antarctic than any other American. Siple accompanied all the Byrd expeditions, and on the first one he got on the track of the layer principle.

Instead of loading the body down with furs to keep it warm, Siple reasoned, why not take a lesson from the men who had to stay outdoors all day long—from hunters and woodsmen and farmers? Why not wear several garments of cotton, known for its absorbent qualities, and take off or put on as many as necessary?

Based on this idea, clothing has already been developed that will keep an immobile soldier warm indefinitely at -14° in a four-mile-an-hour wind. At -60°, an active soldier wearing the new clothing can last two hours. To do even this, over the regulation shirt and trousers, high-neck sweater and field jacket, he must wear the following: a fur liner, pile inside; a second fur liner, pile outside; a fur-lined parka; a fur-lined cap with visor, covered by the fur-lined hood of the parka; woolen gloves, covered by woolen mittens, covered in turn by leather-and-fur shells; field over-trousers.

A choice of footgear is available: combat boot, shoepac or mukluk. The mukluk is good down to -60°, but its soft sole wears

Copyrighted material

badly on rocks, and its lack of arch support prevents its wearer from carrying heavy loads any great distance. The warmth of the mukluk is increased even further by wearing inside it two pairs of ski socks, two pairs of cushion-sole wool socks and two pairs of felt inner soles.

Thus attired, the polar soldier has reached the point of diminishing returns. His weight has been increased by 30 pounds, and his body area has been increased to the point where heat loss almost exceeds heat retention. Tests show that the next step must be protection either by electricity, like flight uniforms, or by such insulating compositions as fiberglas.

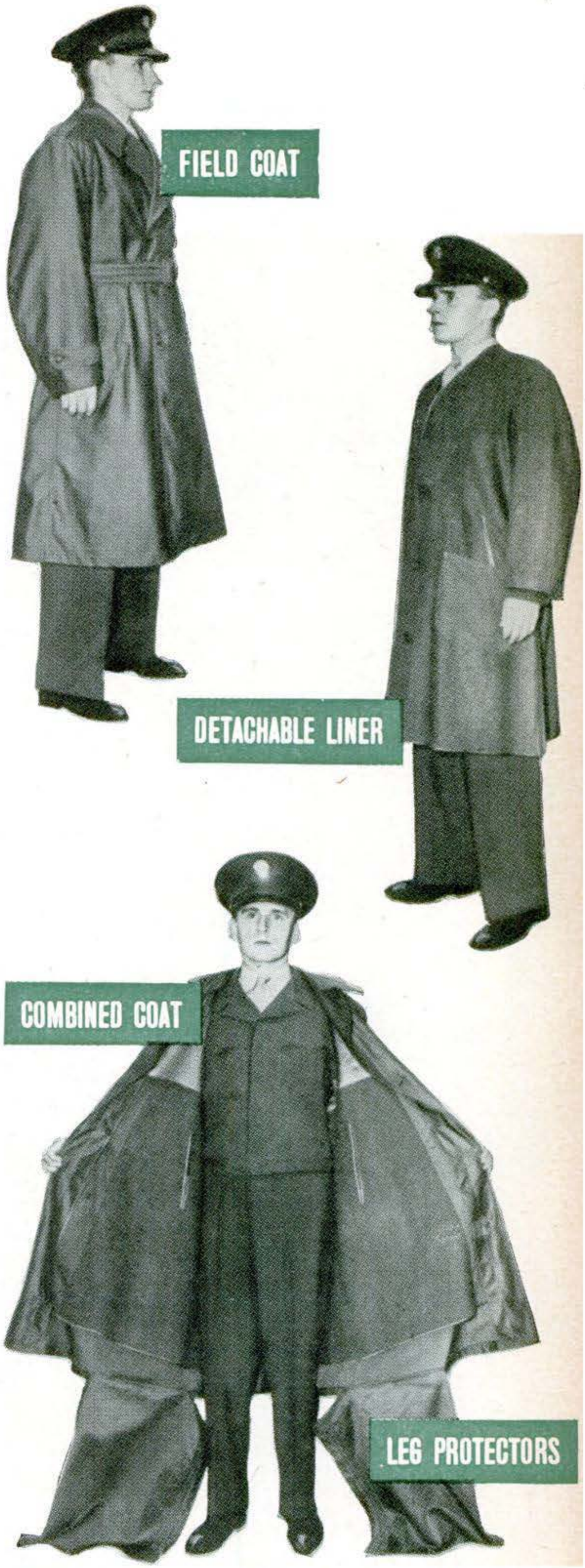
The problem of footgear is a puzzler all its own. The combat boot, possibly the most publicized clothing item of World War II, never was truly loved by its wearers. If the boot was completely watertight, the foot, unable to "breathe," perspired. Trench foot resulted. If the boot was porous enough to permit air circulation, water got in, too. Again trench foot was the result.

Best all-around boot to date is the leather-topped, rubber-footed shoepac, some models of which reached combat units in the winter of 1944-'45. The doughfoot, who took the shoepac gladly in his foxhole because it cut trench foot by 85 percent, had to toss it

away on the road when his arches broke down after a couple of miles of marching. He may be interested to know that this was only another case of Army snafu. Col. M. E. Barker, in the April 1947 *Infantry Journal* points out that the Army failed at any time during the war to provide the inner sole with arch supporter for the shoepac, which would have made a tremendous difference.

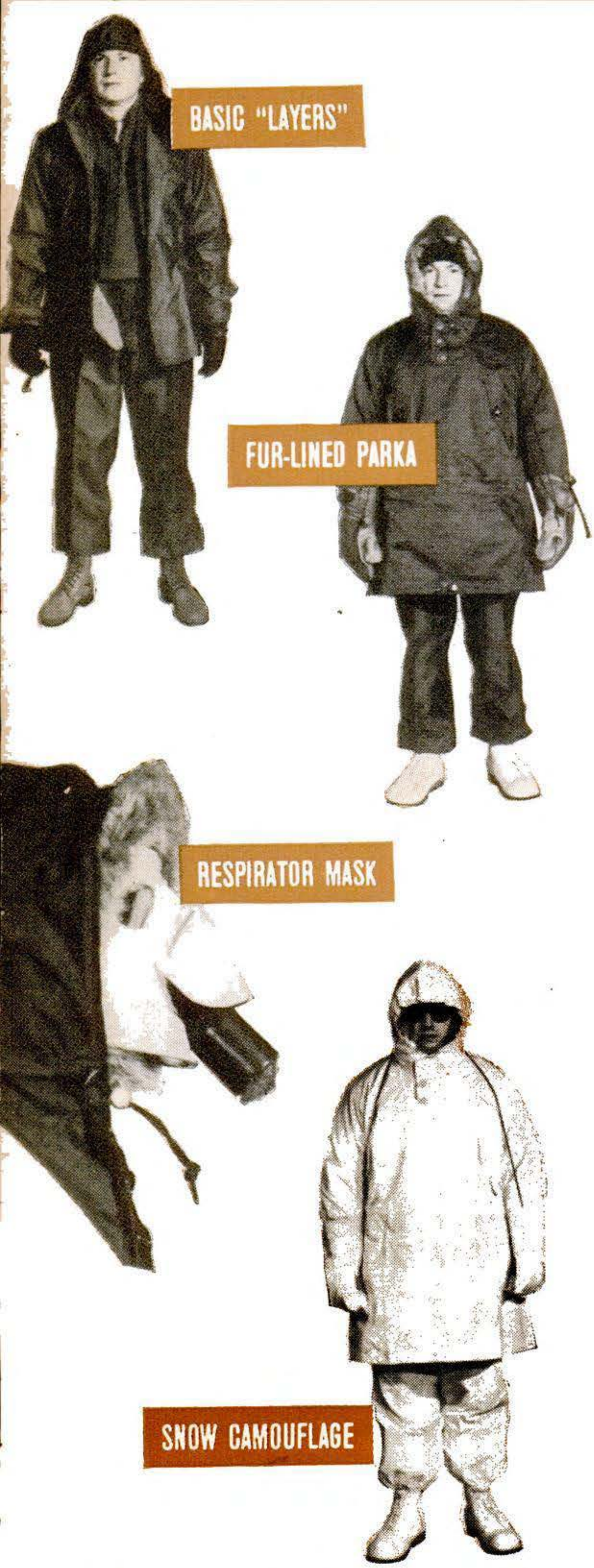
Chief drawback, even in the latest model shoepac, is leakage where the rubber and leather are stitched together. The solution may come through one of the various cements or treated threads now being tested.

One of the cold-climate problems already well on its way to being licked is that of



Field coat with sateen shell and a detachable wool liner, both water-repellent, will replace the old overcoat and raincoat. The trouser hoods button around shoe tops for protection from heavy rains.

Copyrighted material



The colder it grows, the more layers you put on, starting with the basic field dress and ending up with snow camouflage suit when necessary. The respirator mask protects lungs from extreme cold.

giving the soldier a chance to get plenty of air into his lungs. Offhand, that might seem to be no problem at all, but at temperatures of 40 to 50 below zero, the amount of heat lost by merely breathing is of serious concern.

The solution was the invention of the heat-regenerating respirator, a device that retains the warmth of an exhaled breath and uses it to warm up the next lungful on its way in. This saves the soldier from breathing painfully cold air and helps conserve the warmth of his body.

In the hot Pacific and other tropical areas, you undress instead of dressing. Comfort lies in taking as many clothes off as possible. While the Army has not yet taken the seemingly logical step of adopting the British and Aussie uniform of sport-shirt-cum-shorts, which many GIs adopted for themselves, a great deal has been done to give the soldier greater protection from the chief natural hardships of jungle warfare—sun, mildew, undergrowth and insects.

Chief development in this field is a new light fabric impervious to these annoyances, including the sting of insects, which had a field day on wet sun-tans.

One of the most important single steps in the campaign to increase military health and comfort was accomplished recently in the Biological Laboratories of the Philadelphia QM Depot. A team of biologists and chemists, headed by Dr. Ralph G. H. Siu, gained what appears to be final victory over mildew damage.

Not only did mildew, common term for about 400,000 destructive fungi, cause incalculable monetary damage; its cost in discomfort and illness among American troops was far more important. In an effort to lick this pest 30-year-old Dr. Siu, a native of Honolulu, sent scientific missions all over the world. Using their reports, he reduced the number of fungus and bacteria malefactors to about 10,000. Two hundred of these were marked as chief offenders, of

Copyrighted material

which a score were finally identified as the most destructive.

Dr. Siu found that when fungi attack a cotton fiber they use an enzyme, an organic substance serving as an agent for breaking down the main component of the fiber, cellulose. The enzyme first attacks the molecule of the cellulose and converts it into sugar, after which the fungus is able to absorb the sugar through its cell walls. Most important of the discoveries was that for the enzyme to convert the cellulose molecule into sugar, it first had to match, at least roughly, the shape of the molecule. It seemed, therefore, that the most hopeful course lay in changing the shape of the cotton fiber molecule, thereby making it impossible for the enzyme to attach itself.

Further studies showed that several treatments already administered to fabric for fire resistance, water repellency and other purposes *actually changed the shape of the cellulose molecule.* Fire resistance and mildew resistance in a single treatment are therefore possible.

OQMG believes that soon it can develop a "one-shot" treatment that will make fabrics resist fire, water, mildew, sunlight, shrinkage and possibly even abrasion.

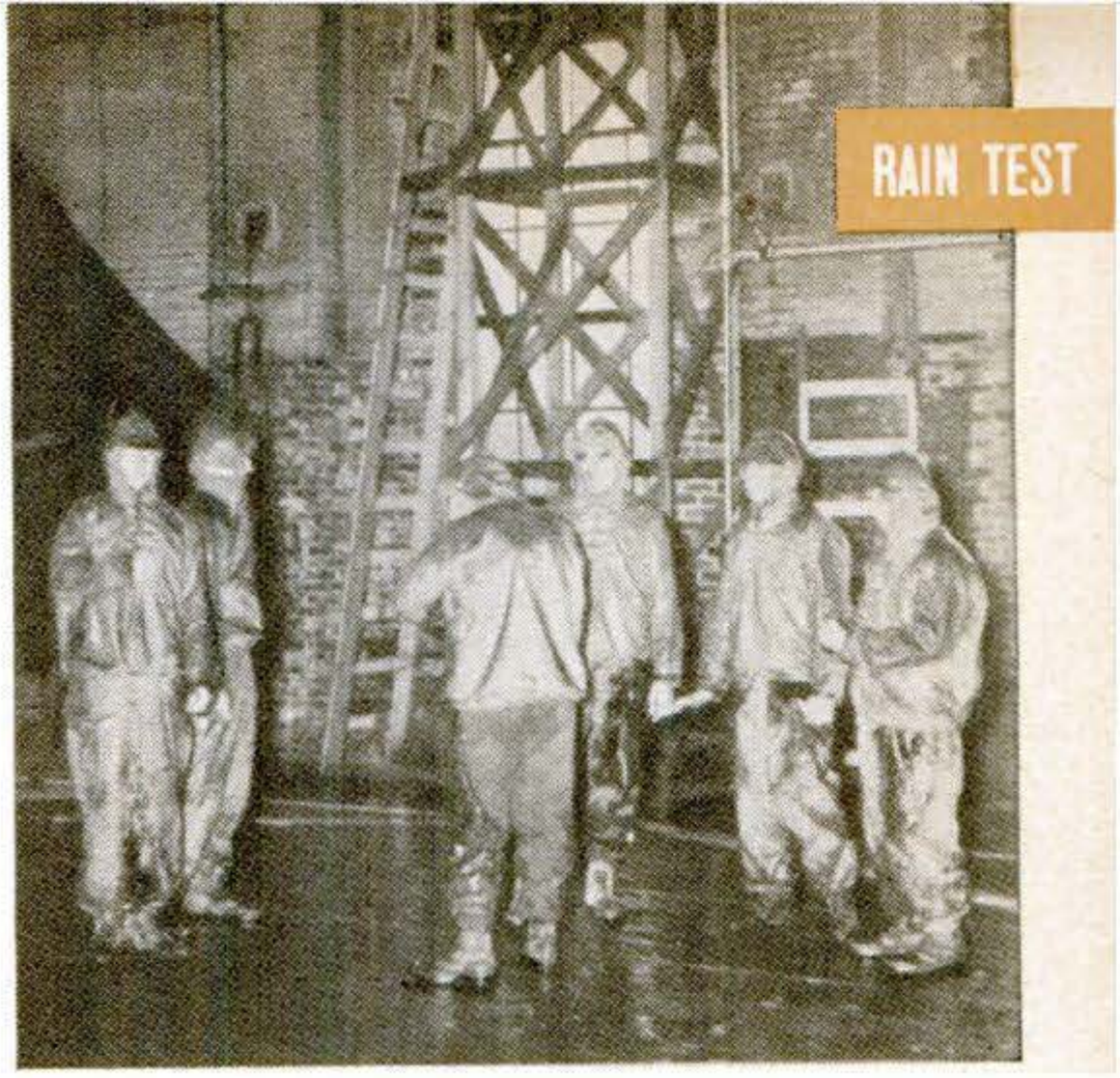
Testing Clothes and Men

Behind most of the uniform changes, and the conquest of such pests as mildew and trench foot, lies the constant research program of the OQMG. At Lawrence, rain rooms, cold rooms and hot rooms have been set up in which both clothing and men are subjected to the severest climatic tests.

In dealing with the comparatively new field of dressing and equipping armies scientifically, the researchers first did not have even a standard of measurement. The standard finally evolved was the CLO. One CLO was said to be equal to the amount of clothing needed to keep an inactive man comfortable in a windless room at 70°.

With this new yardstick, research parties set out to map weather conditions in every accessible region of the earth, month by month. Weather charts were then drawn in CLO units. The "clothing almanac" made up of these CLO unit charts has now become the basic QM guidebook.

Whatever uniform changes are evolved, whatever the new equipment designed, the basic purpose of the QM researchers remains unchanged: to make the GI's life, whatever the conditions may be, an easier one. END



Rain court at OQMG laboratory tests clothing in fogs, drizzles or downpours.

Testing dexterity while wearing gloves; polar troops can't work without them.

Soaking shoes for hours at a time is one step in the battle against trench foot.

Copyrighted material

Typewriter Catches Mistakes

STENOGRAPHERS can throw away their erasers when they get one of the new "errorless" typewriters. It gives typists a chance to catch mistakes by showing them what a complete line looks like before it is printed. Not until errors have been corrected does any type strike the paper.

The letter keys act only as selectors, closing electrical relay circuits that determine which characters will later be printed. They also position indicators in a window above the keyboard, the way some adding machines do.

After an entire line has been set up in this manner, the typist can read it over and make changes if necessary. Then the print key is pressed, printing the whole line shown, one letter after another.

Lines can also be justified—expanded or contracted to make the right as well as the left margin exactly even. Another feature is a signal to tell the typist how much space remains at the bottom of the page. In addition, the machine can be equipped with different sizes and styles of type.

Striking the keys permits a series of movable bars, one for each space in the type line, to slide forward until stopped by pins representing the various letters to be used. The letter keys are simply switches controlling solenoids that drop the proper pins into the stopping positions.

When the print key is struck, a sensing carriage moves across the bars and connects each one, one at a time, to the letter its position represents. Completion of this electric contact makes the letter strike the paper. The paper, unlike that in other machines, remains stationary while the type assembly moves with the carriage from left to right. Line spacing is automatic.

Invented by Robert S. Wallach, president of the Associated Development and Research Corp., the machine is still in the experimental stage, and production is not expected for at least another year.

Cost? The first ones will probably sell for a little less than $1,000. Later, mass production models—minus a few of the de luxe features—may be made for about $250.

Skystreak

This Month's Pin-up

SLEEK, sturdy and stub-winged, the jet-propelled D-558 Skystreak may be the first piloted plane to attain the speed of sound (PSM, Mar. '47, p. 93).

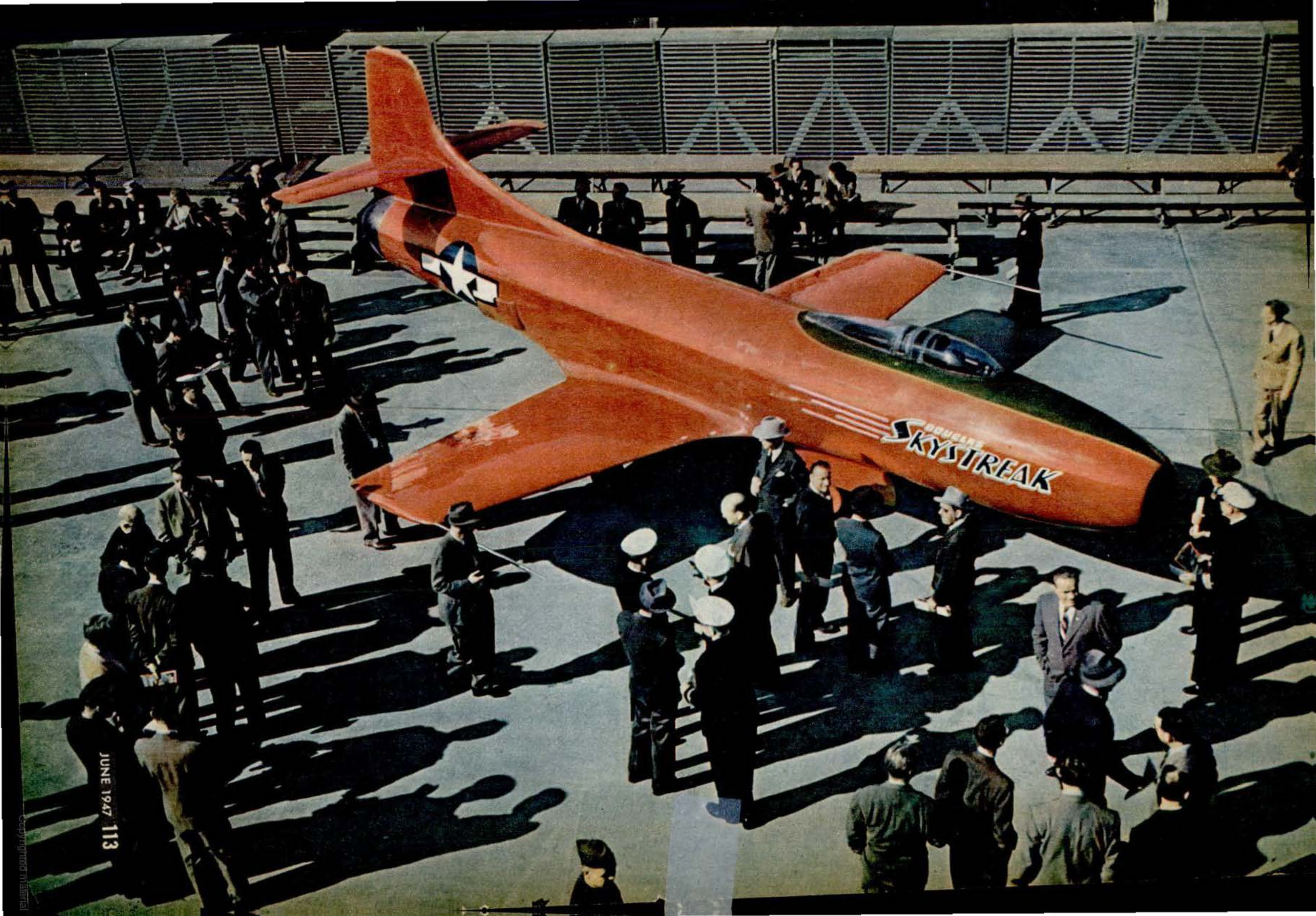
Built by Douglas for the Navy, the craft's TG-180 turbo-jet engine develops a force equal to that of four B-29 engines wide open. Its unbraced, tubelike magnesium fuselage is 35 feet long, while its thin wings have a span of only 25 feet.

Designed to withstand loads greater than 18 times the force of gravity, it features a jettisonable cockpit for pilot safety and hydraulically operated air brakes.

Split-nose scoop channels air past pilot to engine.

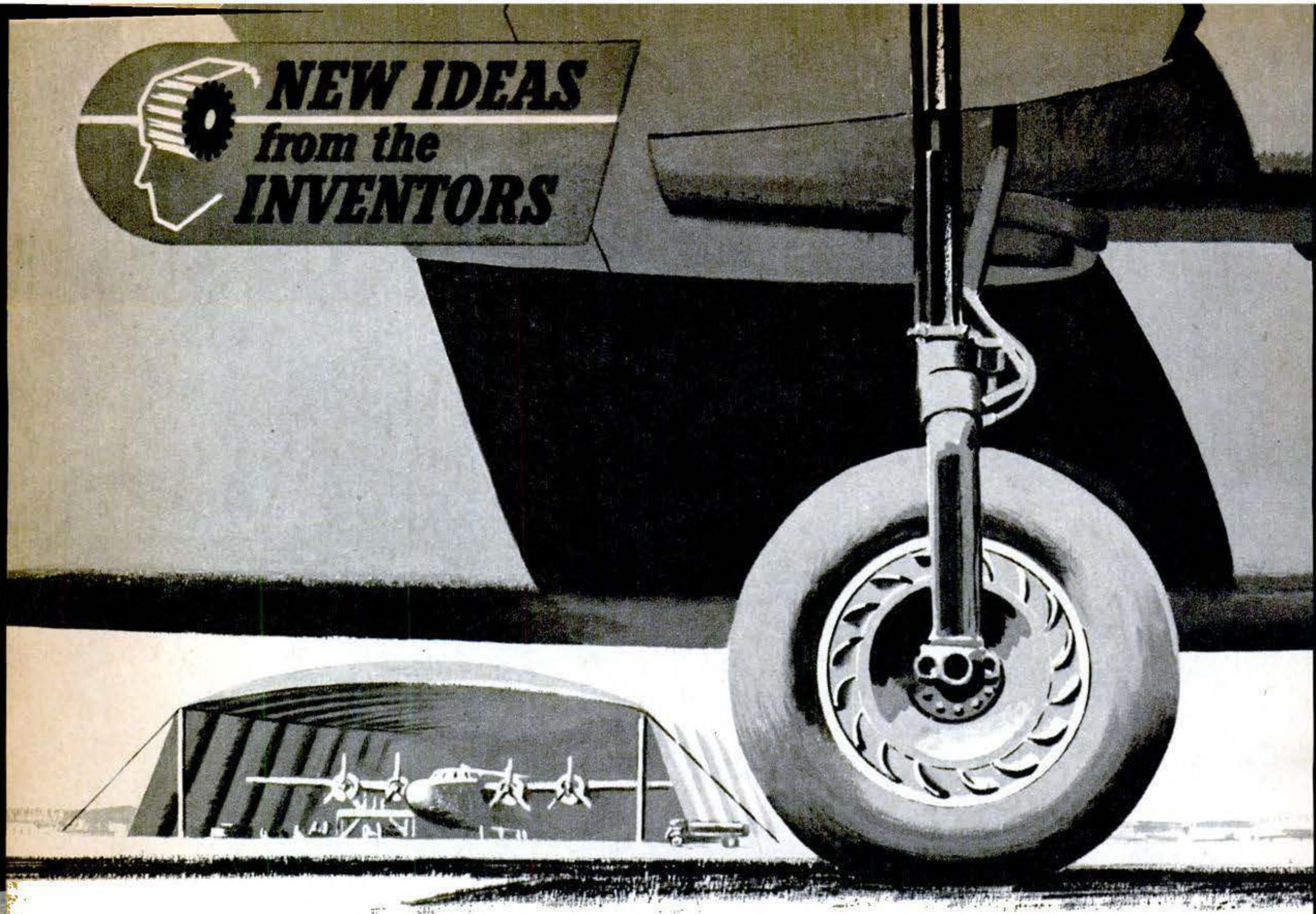
Tiny tires are eight-ply nylon inflated to 230 lb.

Copyrighted material



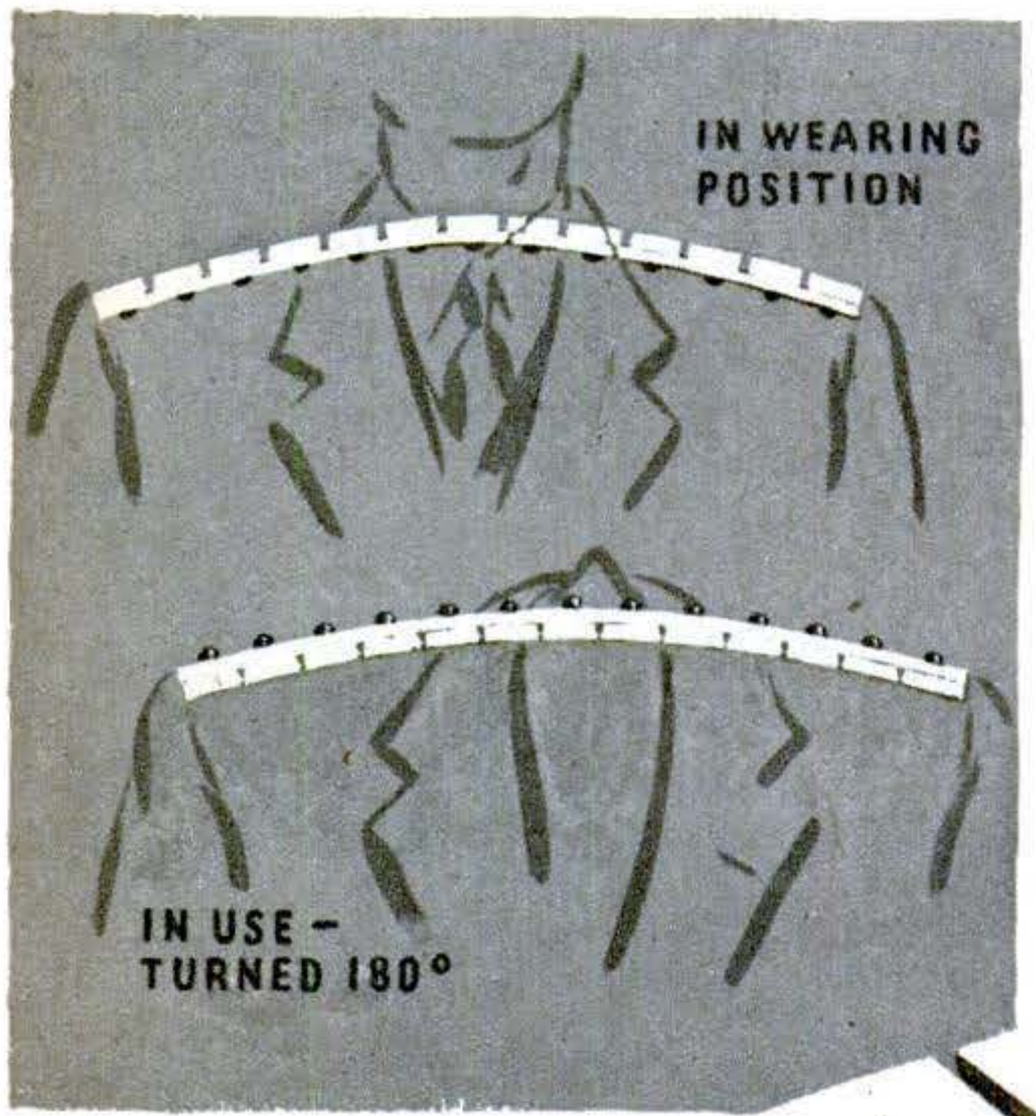
Copyrighted material

NEW IDEAS from the INVENTORS

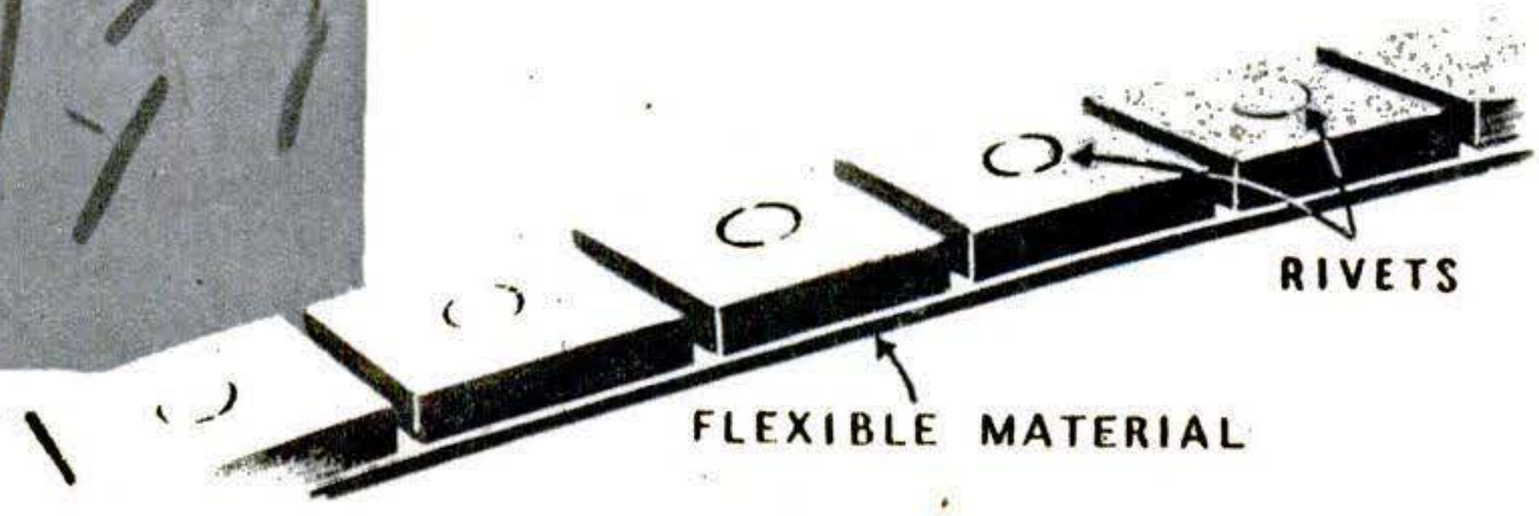


Helium-supported Hangar. To simplify the housing of large planes, Emil R. Capita, of North Bergen, N. J., has designed a tentlike fabric hangar. Its top contains hollow cells that, filled with helium, hold up the roof and help support the walls, which are guyed to tent pegs.

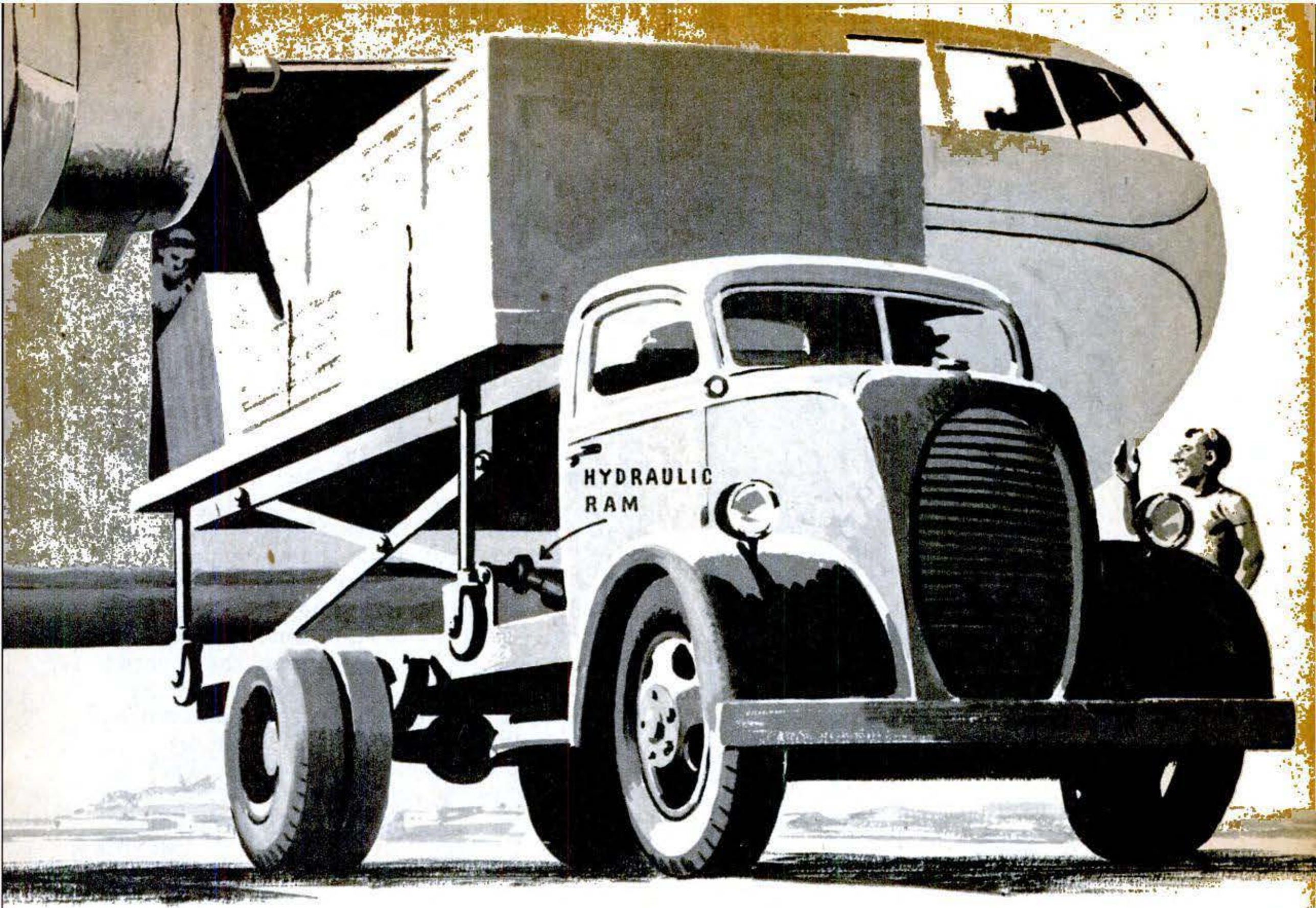
"Windmill" for Landing Gear. Pre-rotation of airplane wheels to lessen landing friction is achieved by cupped vanes in an invention by Bernard D. Branner, of Waterford, Conn. The vanes, which can be separate units or a single circular casting, can be attached directly to the wheel rims.



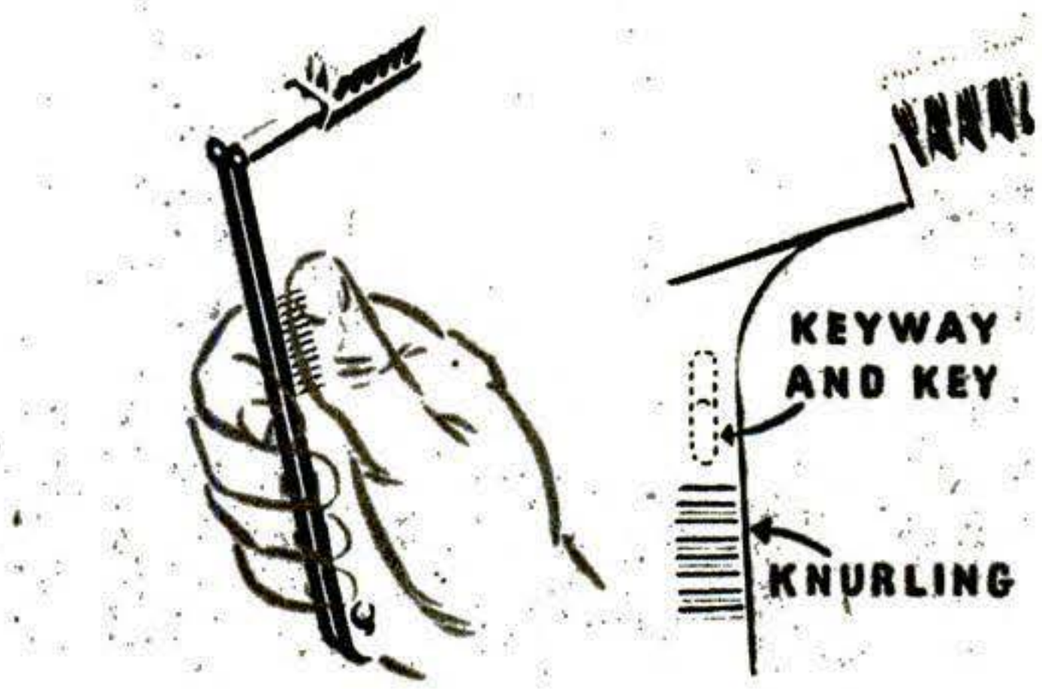
Built-in Coat Hanger. A man could hang his coat on any hook and not worry about wrinkles with a coat hanger invented by Rudolf Senn, of Basle, Switzerland. It is a strip of flexible material with a series of closely spaced blocks on one side. Fitted loosely into a sleevelike covering, stitched in the shoulder lining, the strip bends freely when the blocks are uppermost. Turned over so that the blocks jam together and restrict bending, it forms a rod that holds the coat in shape.



Copyrighted material



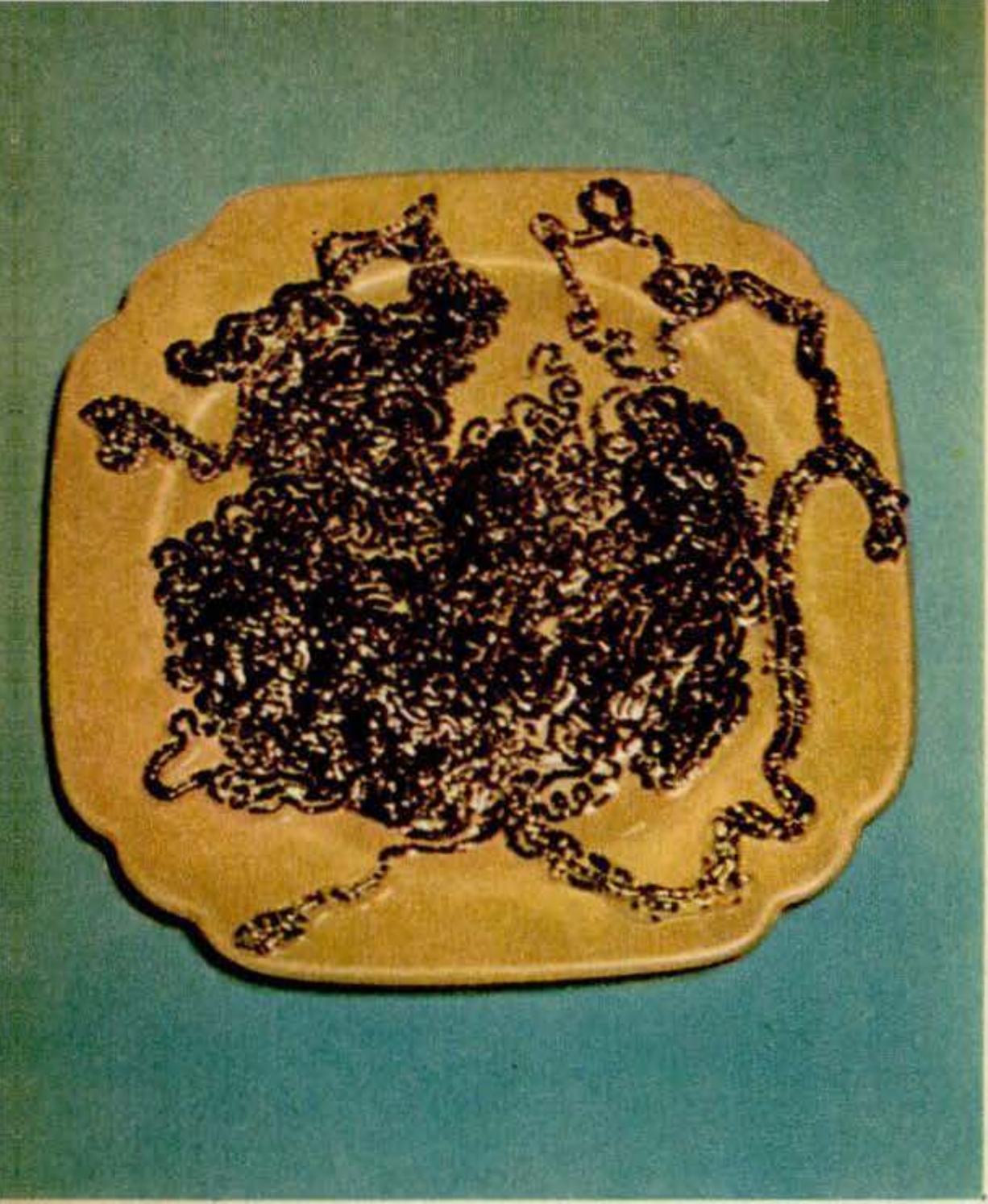
Air-cargo Elevator Truck. For speedier loading of cargo planes with fewer trucks than are ordinarily required, Norman Kuehlman and Henry French, of Wisconsin, have designed a truck with a hydraulic lift and a separate freight body. The freight section has movable legs and wheels, operated by an electric motor independent of the truck itself. When the legs are raised, the body automatically locks itself to the truck; when they are lowered, the body is released. The design permits one truck to handle several freight bodies, hauling one while others are loaded.



Mechanized Toothbrush. The handle of a toothbrush invented by Emanuel Aaron, of New York, is divided into two sliding parts. Moving them up and down in relation to each other (which can be done with one hand) causes the brush head to turn back and forth against the teeth.

Vertical Clock Face. A drum with a dark pattern of 12 steps on it, visible through a vertical slot marked in hours, is the face of a clock devised by Joseph L. Smith, of Chicago. The highest portion of the dark pattern shows the hour; its horizontal width indicates minutes.

Copyrighted material



The eggs of the American toad resemble strings of beads covered with a gelatinelike material. The toad starts his life in the water, but leaves after a few weeks and returns only for breeding.

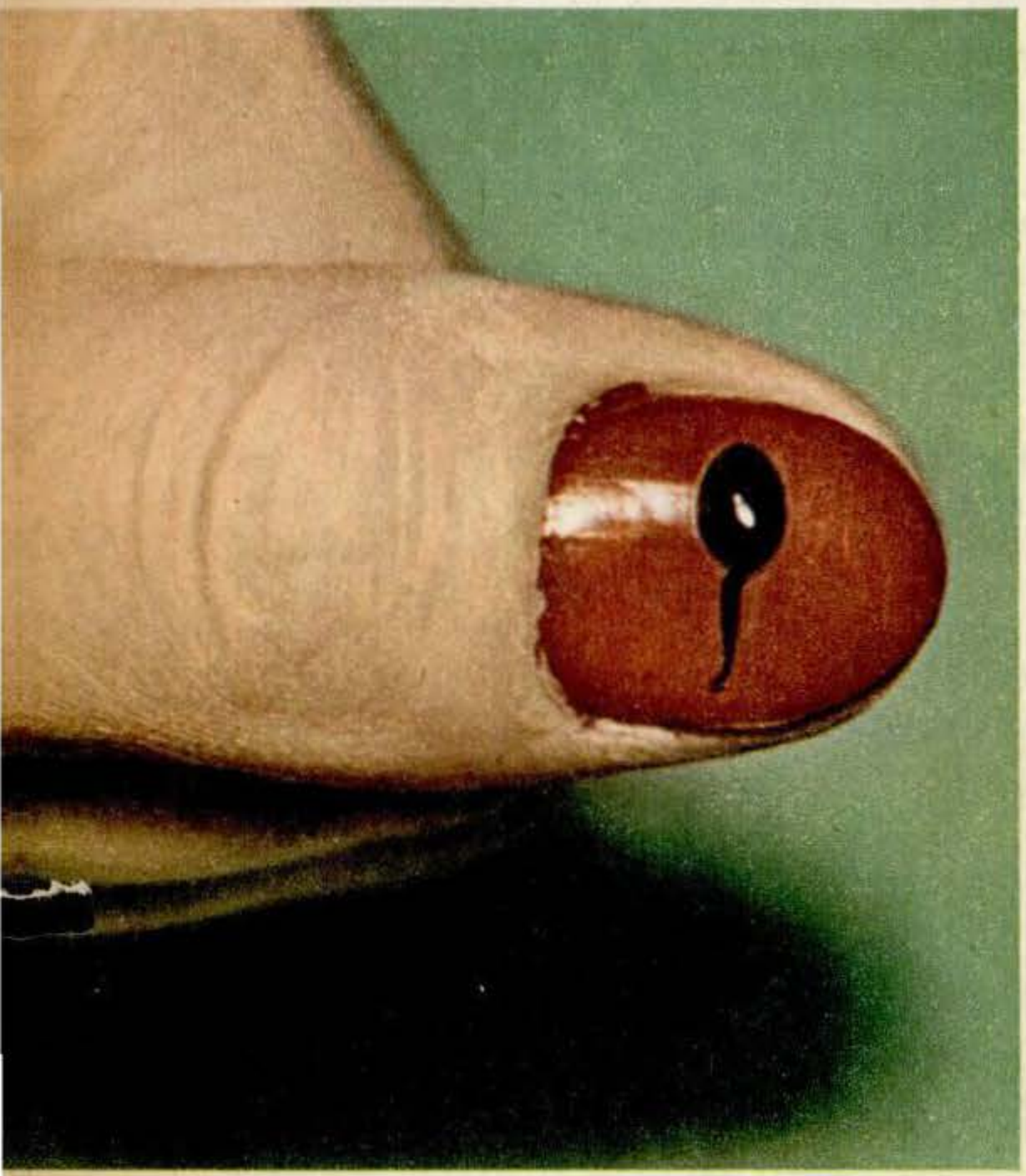
From Egg

It takes eight weeks and a rock to become a land dweller

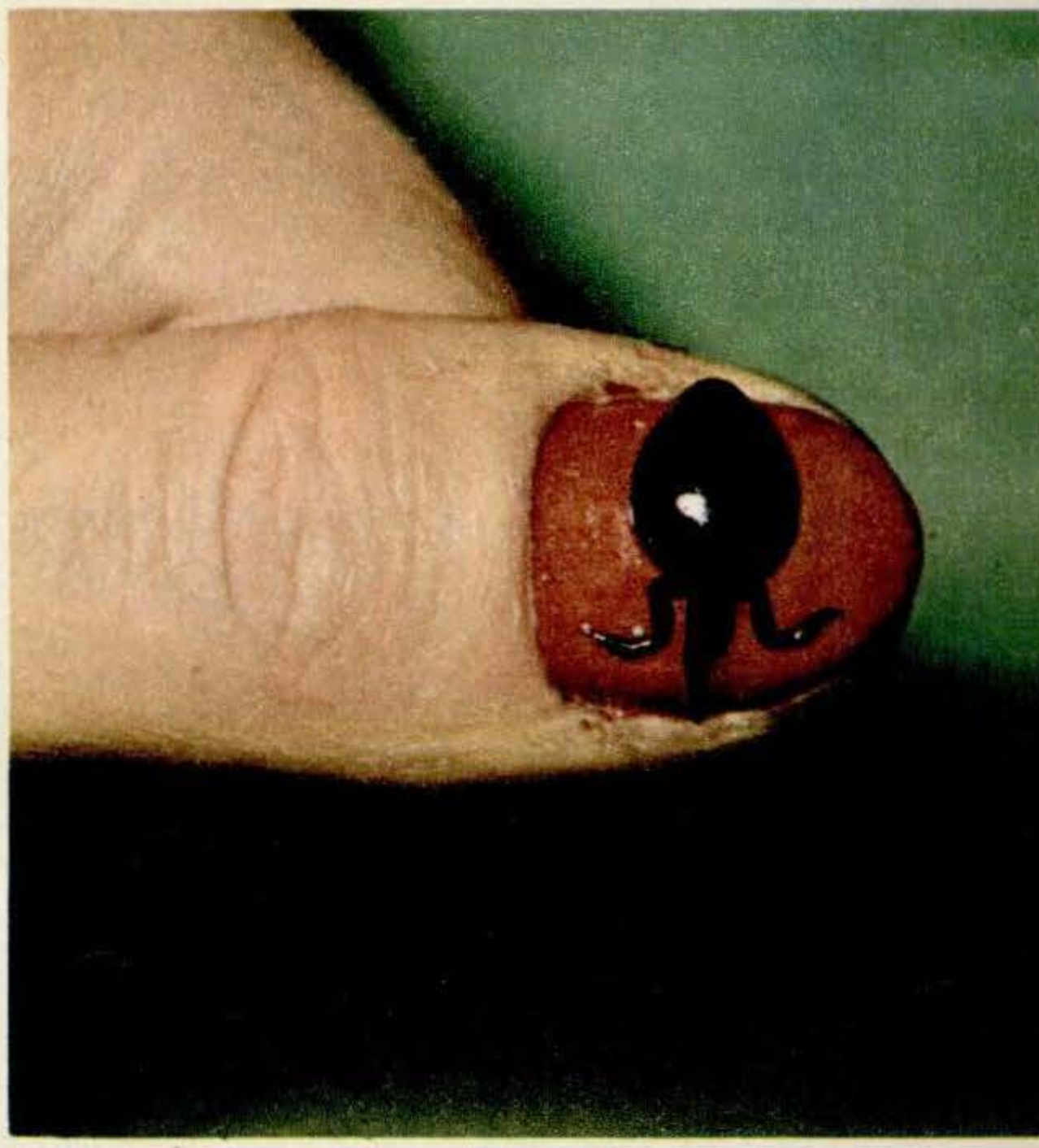
TO MAKE this pictorial life history of the lowly toad required the talents of a hunter, aquarium keeper and photographer —all combined in Hal H. Harrison. Having a wife with a photogenic thumb helped, too.

The first task was capture of a pair of toads, male and female. They were kept in the small aquarium in Harrison's home until the female laid her eggs; then they were turned loose. It was at this point that picture-making began. The eggs were photographed when only about an hour old.

The tadpoles, which hatched in about a week, lived in the aquarium, feeding on the minute plants it contained. Whenever a casual inspection revealed a distinct change in



After about a week, the egg hatches into a tiny tadpole. With the help of the long tail, it can wriggle around in the water. It cannot live in air.



Appearance of the hind legs signals the beginning of the change into a land animal. At this stage the tadpole will crawl out of the water for brief periods.

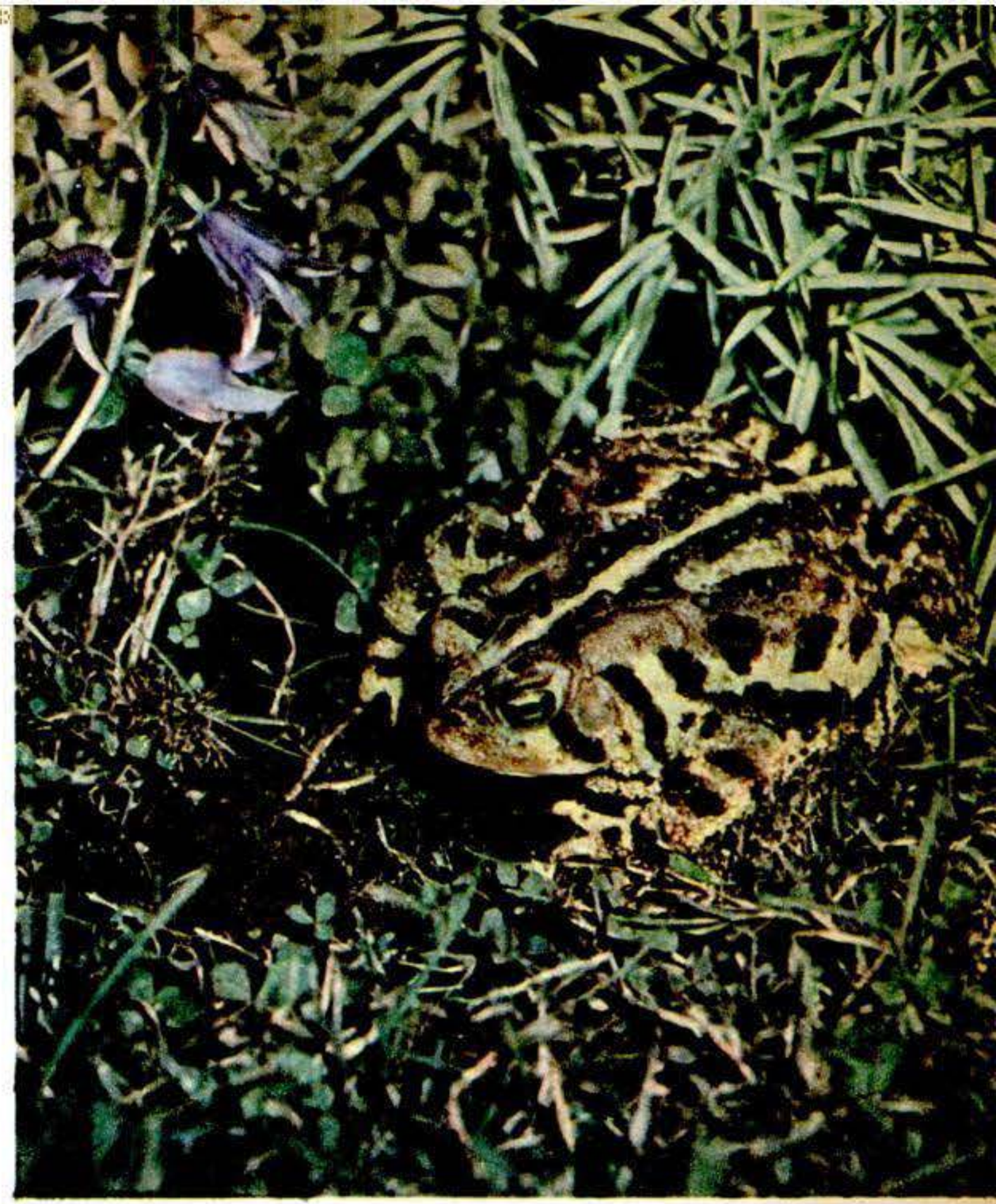
Copyrighted material

....to Toad

the tadpoles' appearance, one was picked out of the water and posed on Mrs. Harrison's thumbnail to indicate size.

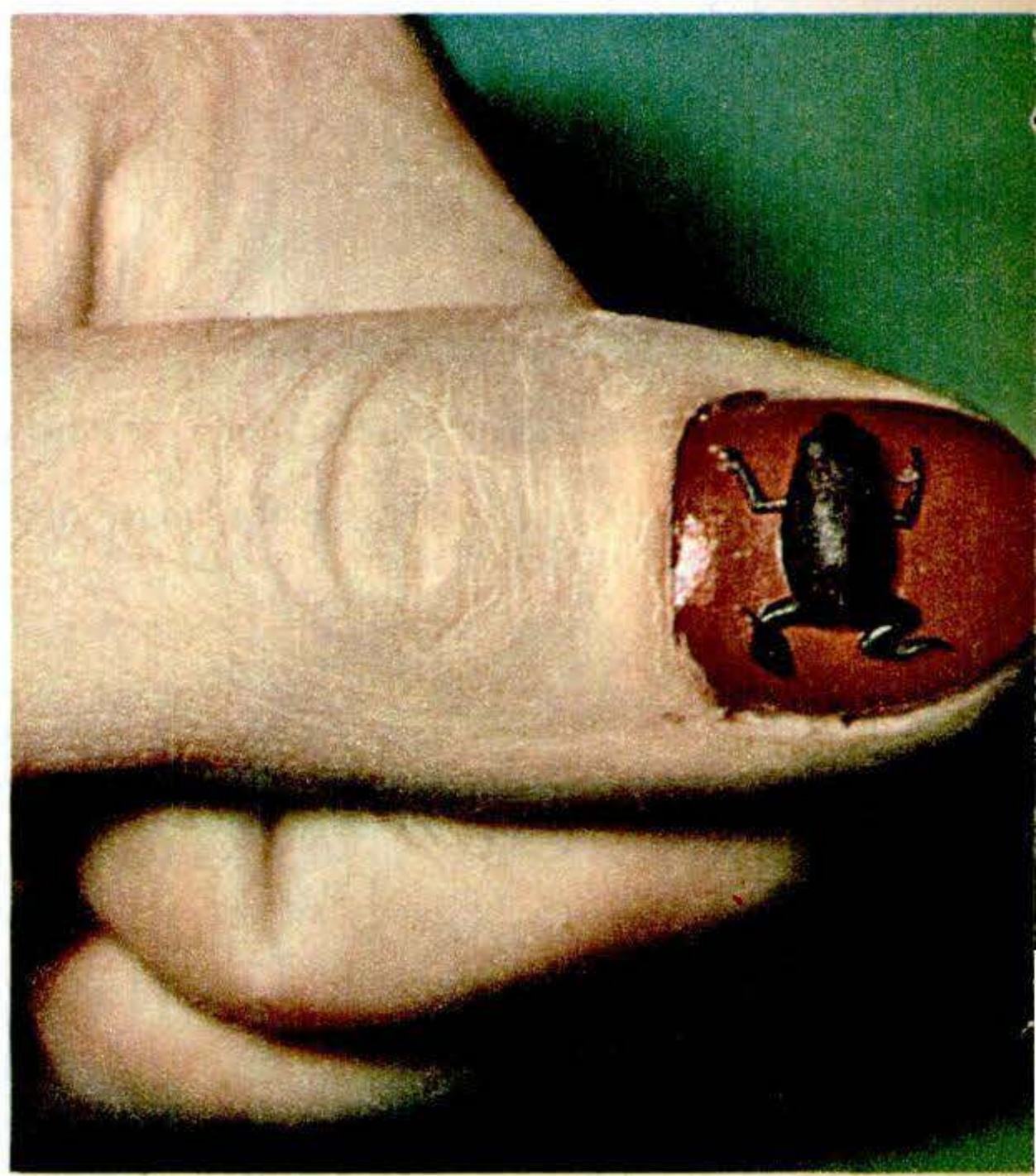
Pictures were taken regularly during the eight weeks a toad needs to change from a squirming water animal to a four-legged land dweller. At one point in their growth, Harrison was puzzled when the tadpoles' legs failed to appear on schedule. A naturalist friend suggested partly submerging a rock in the aquarium. That did the trick. As soon as the tiny animals had a way to crawl out of the water, they began to grow legs.

The transparencies were made with a 3¼ x 4¼ Zeiss Maximar, using a single flash bulb held near the camera. A piece of green blotting paper furnished a simple background with pleasing color contrast. "I was lucky during those eight weeks," reports Harrison. "My wife didn't change the color of her nail polish."



When full grown, the toad is about two to three inches long; thanks to its camouflage coloration, it is almost impossible to see. The toad is highly prized by gardeners, for it eats harmful insects.

Next come the front legs. The tail remains, although now it is not so large compared to the rest of the body. Soon it disappears completely.



About eight weeks after the eggs were laid, the tadpole has become a toad. No longer able to breathe under water, it must now live on land.

Copyrighted material

I'd like to see them make

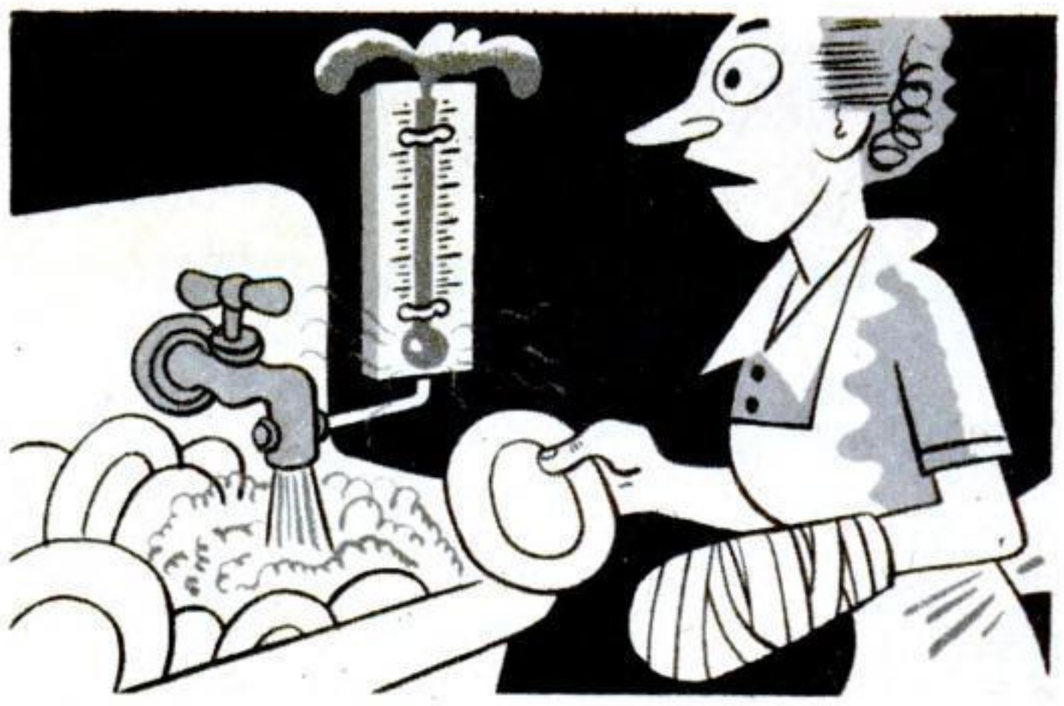
Cartoons by SYD LANDI

Everybody has his own pet idea of some gadget he would like to see in general use. What is YOURS? *Popular Science Monthly* will pay five dollars for every such suggestion that its editors decide to publish. Suggestions cannot be acknowledged or returned.

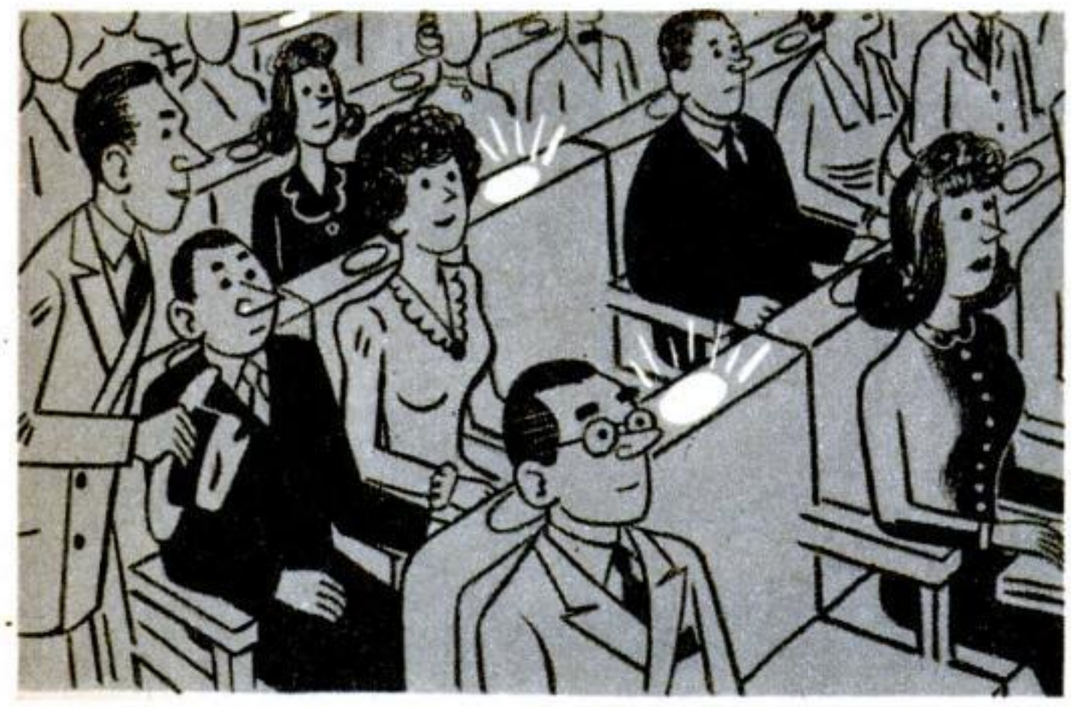
Two-in-one Hair Aid. To save time and insure good grooming, Ernest Narias, of Tampa, Fla., suggests a comb that would dispense hair tonic through its teeth.

Portable Traffic Lights. Where permanent ones are not needed, they would save taxpayers money and the police time, says L. E. Cottingham, of Rowland, N. C.

Splashless Bathtub. One with a watertight top would let Junior splash to his heart's content and keep the house dry, thinks Bob Binks, of New Orleans, La.



Hot-water Warning. To safeguard the dishwasher from scalding water, L. F. Chambering, of Longmeadow, Mass., would equip the faucet with a thermometer.



Sure-find Seat Lights. Small lights on vacant theater seats would take the guesswork out of hunting for one, declares L. J. Herbert, of Lexington, Mass.

Rain Guards for Mailboxes. Anyone who has tried to mail a letter in the rain would welcome protection, believes Dorothy Tooker, of Larchmont, N. Y.

Copyrighted material

With television, the make-up artist has crashed the broadcasting studio—and uses the latest scientific methods. Here moulage (casting material) is applied to the face of actor Stephen Courtleigh, being made up as Abraham Lincoln.

The complete moulage mold is removed from Courtleigh's face—and it doesn't even stick to his hair. A positive cast of the actor's face will now be made from the negative moulage. The make-up is for a broadcast over station WNBT, New York.

Sculping a Television Lincoln

The make-up artist, Richard Smith, compares the cast of Courtleigh's face with one of Lincoln's. To make them look alike, he applies latex rubber to the actor's cast for higher cheekbones, ridges over the eyebrows, prominent nose and bigger chin.

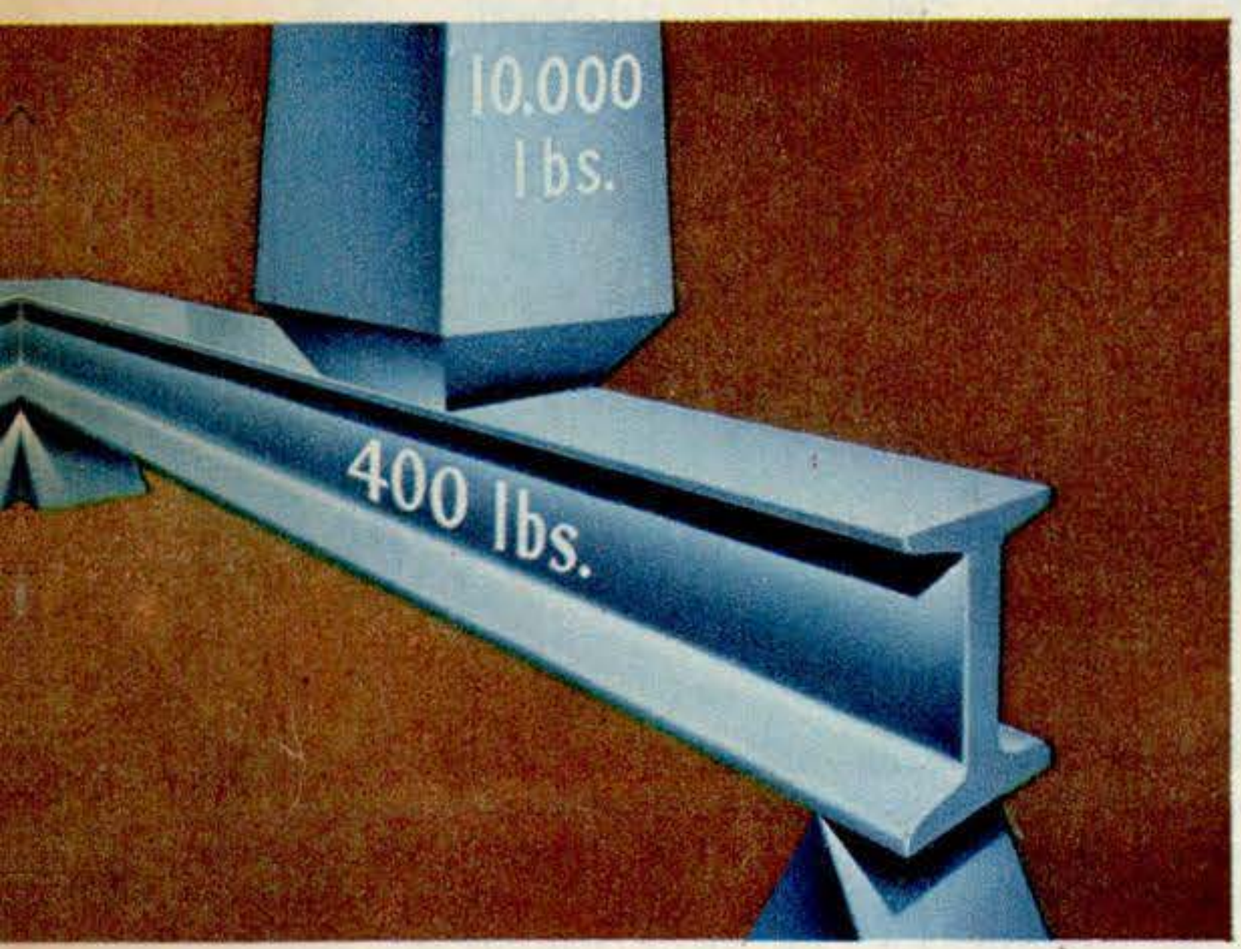
The rubber pieces modeled on the plaster cast are applied to the actor's face to give it Lincoln-esque contours, including the famous wart. Make-up and grease paint will now be applied over the new features for the final illusion of reality.

Copyrighted material

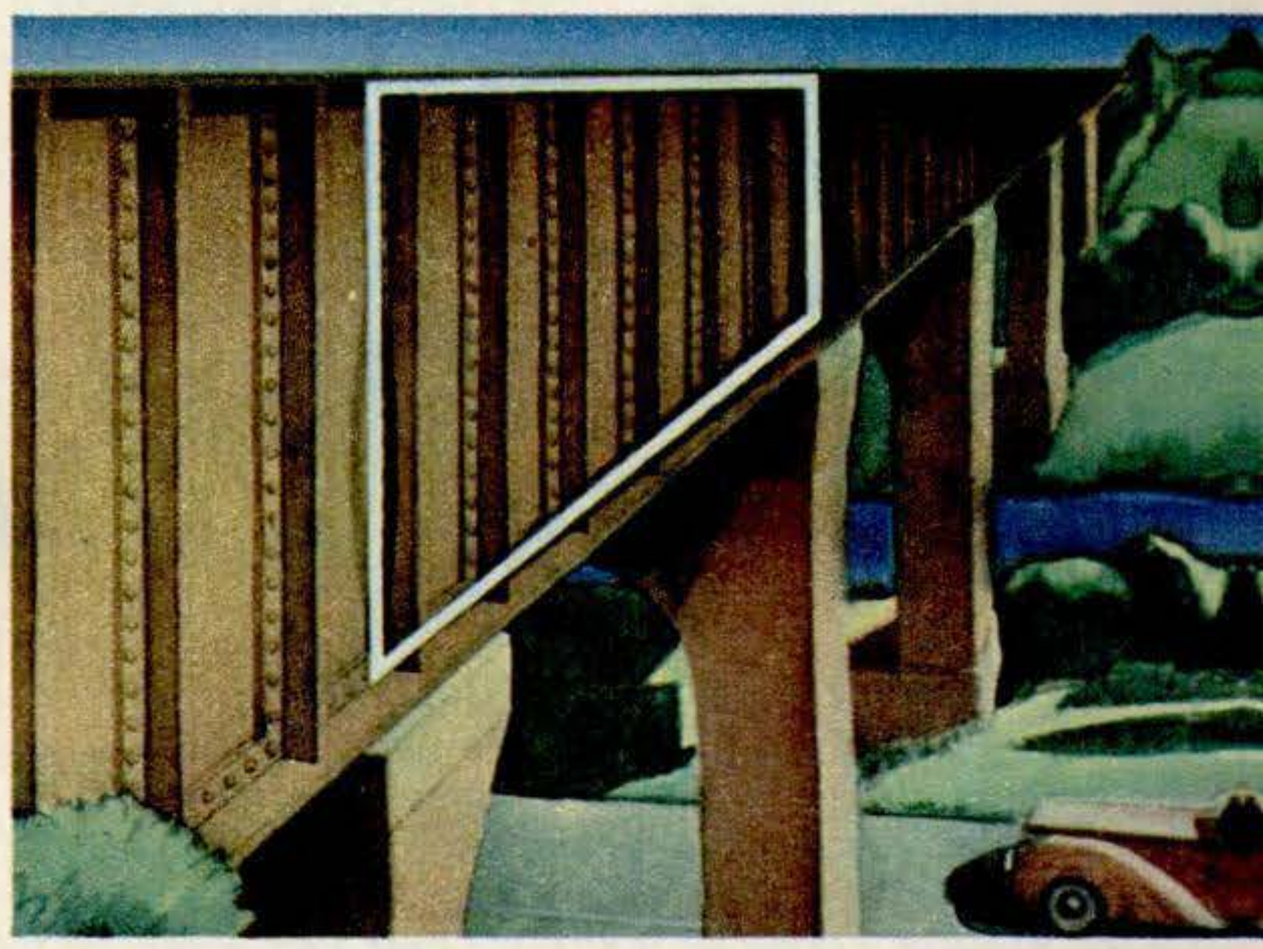
Movie Cartoon Shows Welding Benefits

MAN is always seeking better ways to join things together. First he tied them together with rawhide; later he used wooden pegs, iron spikes and nails, bolts and nuts, and then rivets. Finally, as shown by these pictures from the film *Design for Arc-welded Structures,* made by Herb Lamb Productions for the Lincoln Electric Company, arc welding has gone a step further in removing limiting factors. Electrical welding allows more freedom of design. It permits structural members to be joined directly, retaining the full strength of the material in any combination of shapes.

Modern design is arc welding's partner in making cheaper and better girders. Two channel sections can be welded to form a box section, impossible with riveting. Special shapes of I-beams may be welded from plates of different thicknesses. Tension and compression members, and beams can be welded without adding weight or losing strength. This sequence from the film tells the story of a welded plate girder.



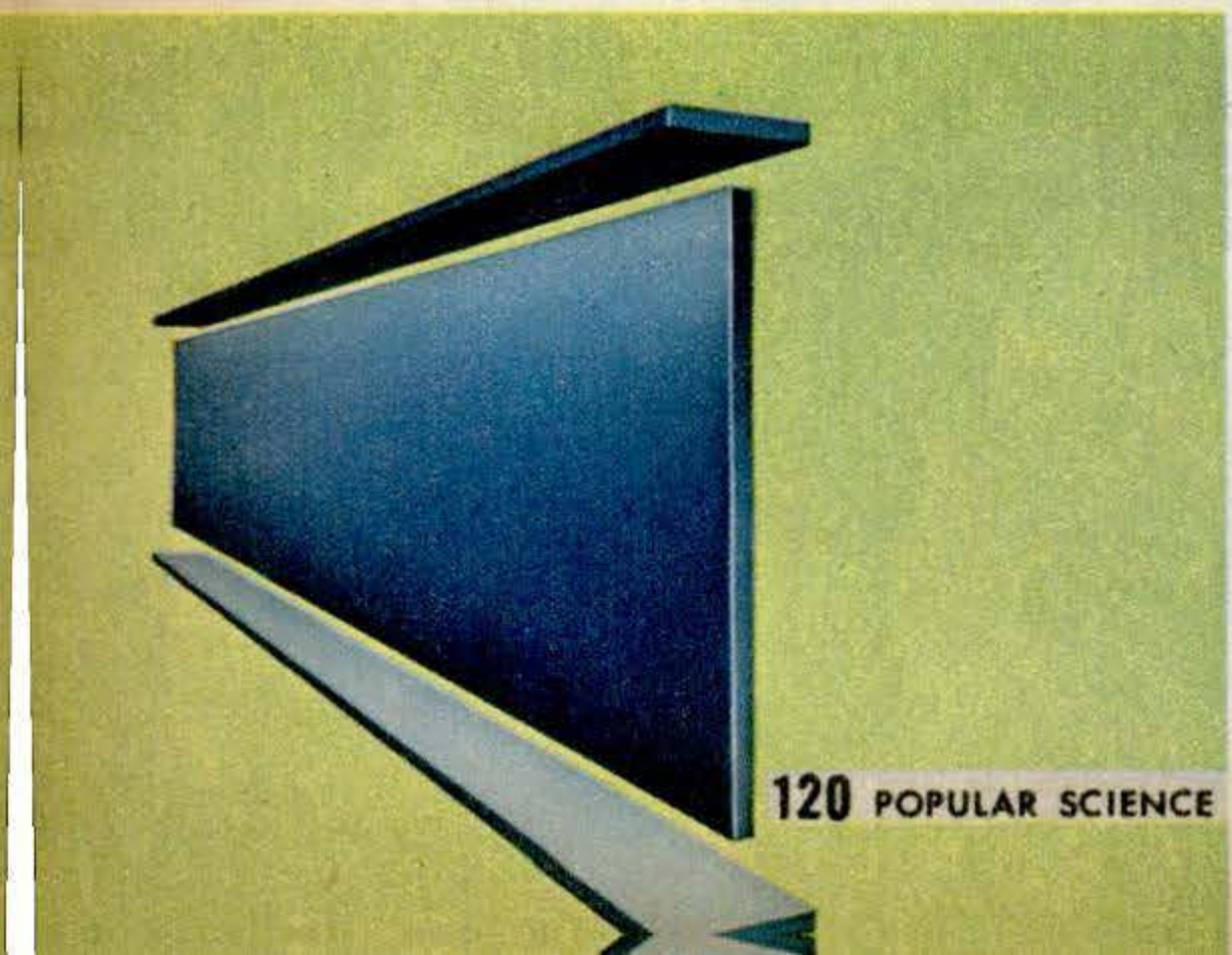
3. Twelve hundred pounds of useless material have been removed and the I-beam now weighs only 400 lb. Yet it will still carry 10,000 lb.—in fact, it will bend less than the solid beam four times its weight.

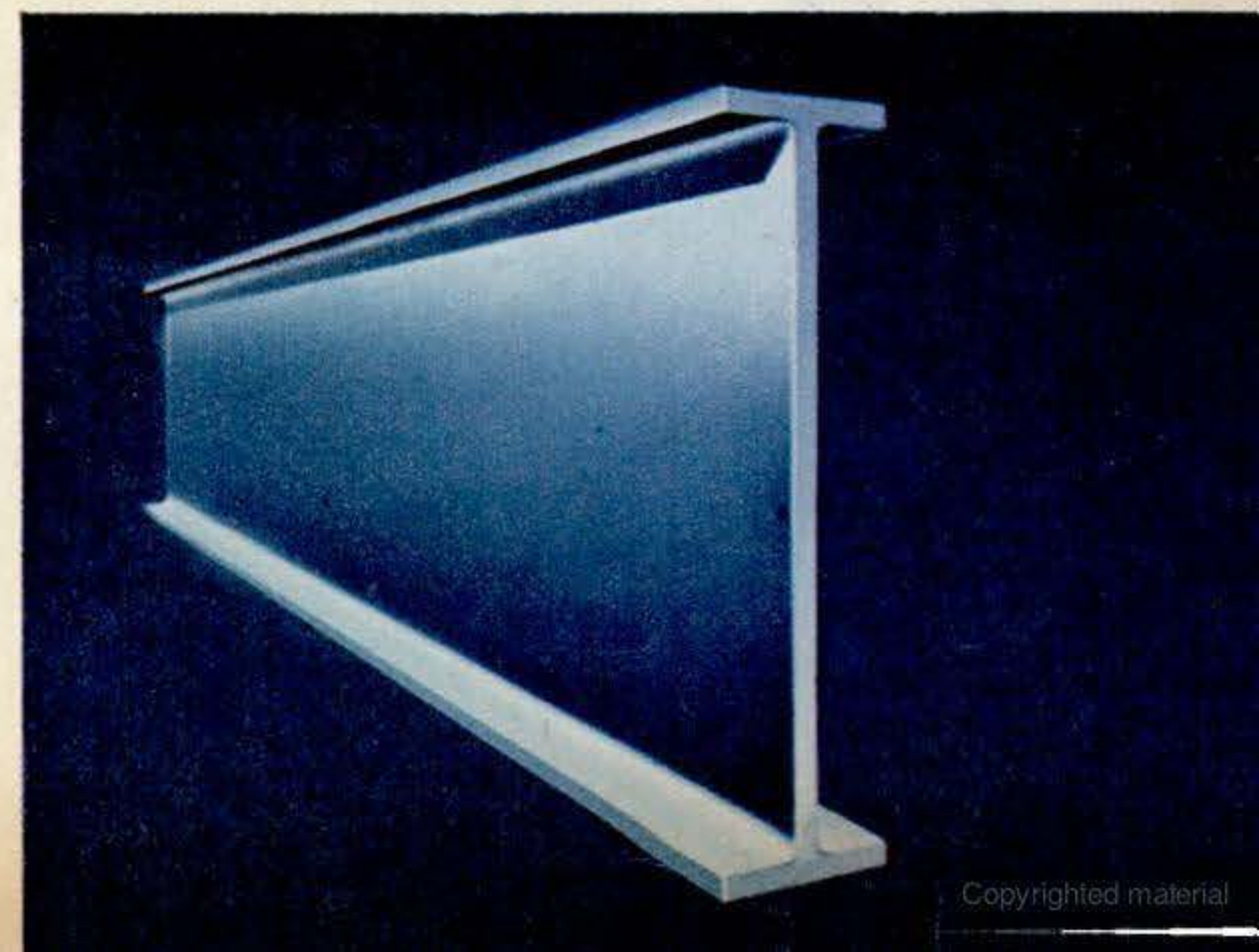


4. This riveted plate girder, used for bridgebuilding, offers a typical example of how a combination of good design and the latest fabricating methods can cut weight and costs.

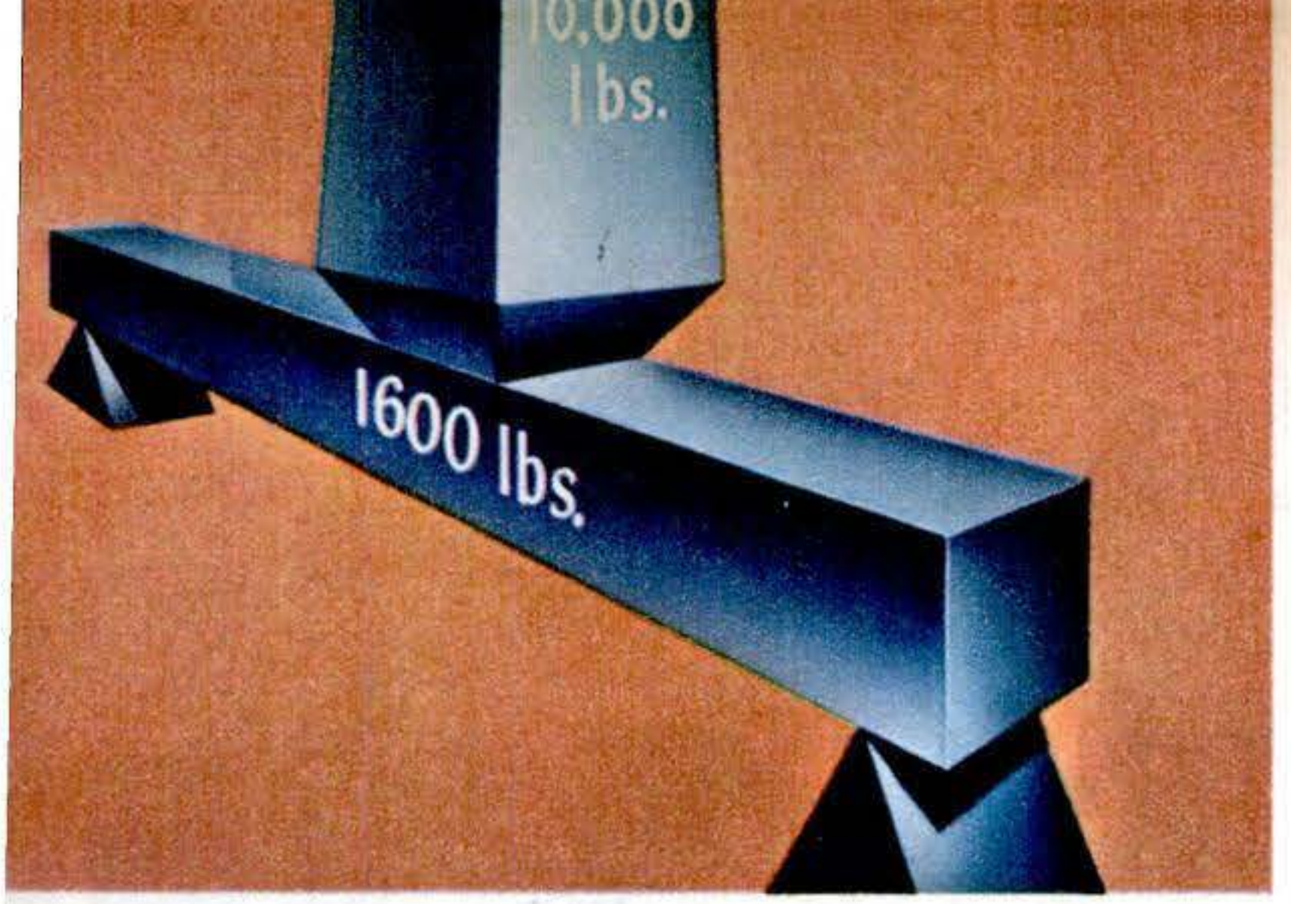
7. The answer, says Lincoln, is arc welding. No rivets are used, the flange angles are not needed and no weakening holes are made. The designer needs only the web plate and a pair of 1½-inch plates. The result is a streamlined girder.

8. There are no overlapping flat surfaces, no holes, no excess bulk and weight. The structural members are joined directly, retaining the full strength of the material. Of course, any combination of shapes is possible with arc welding.

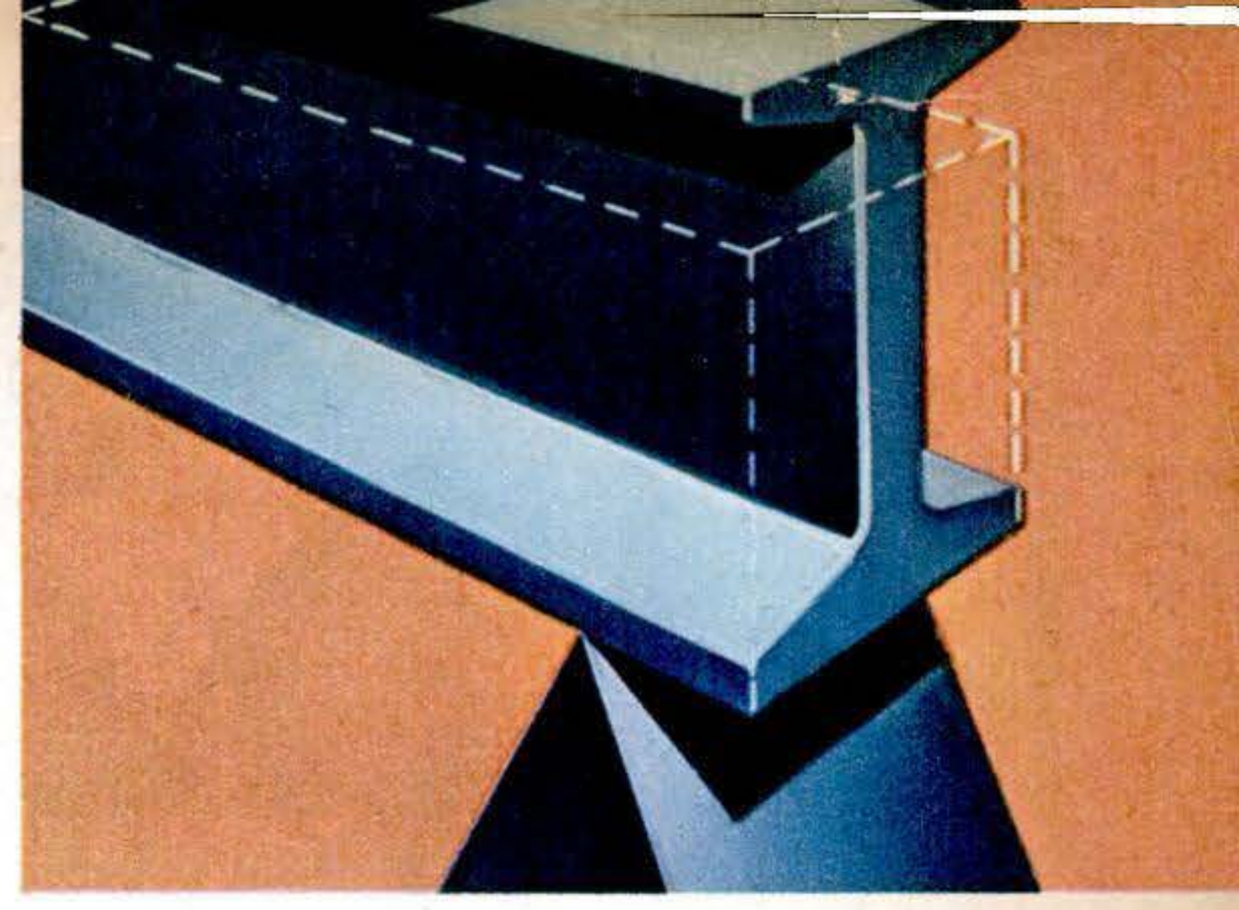




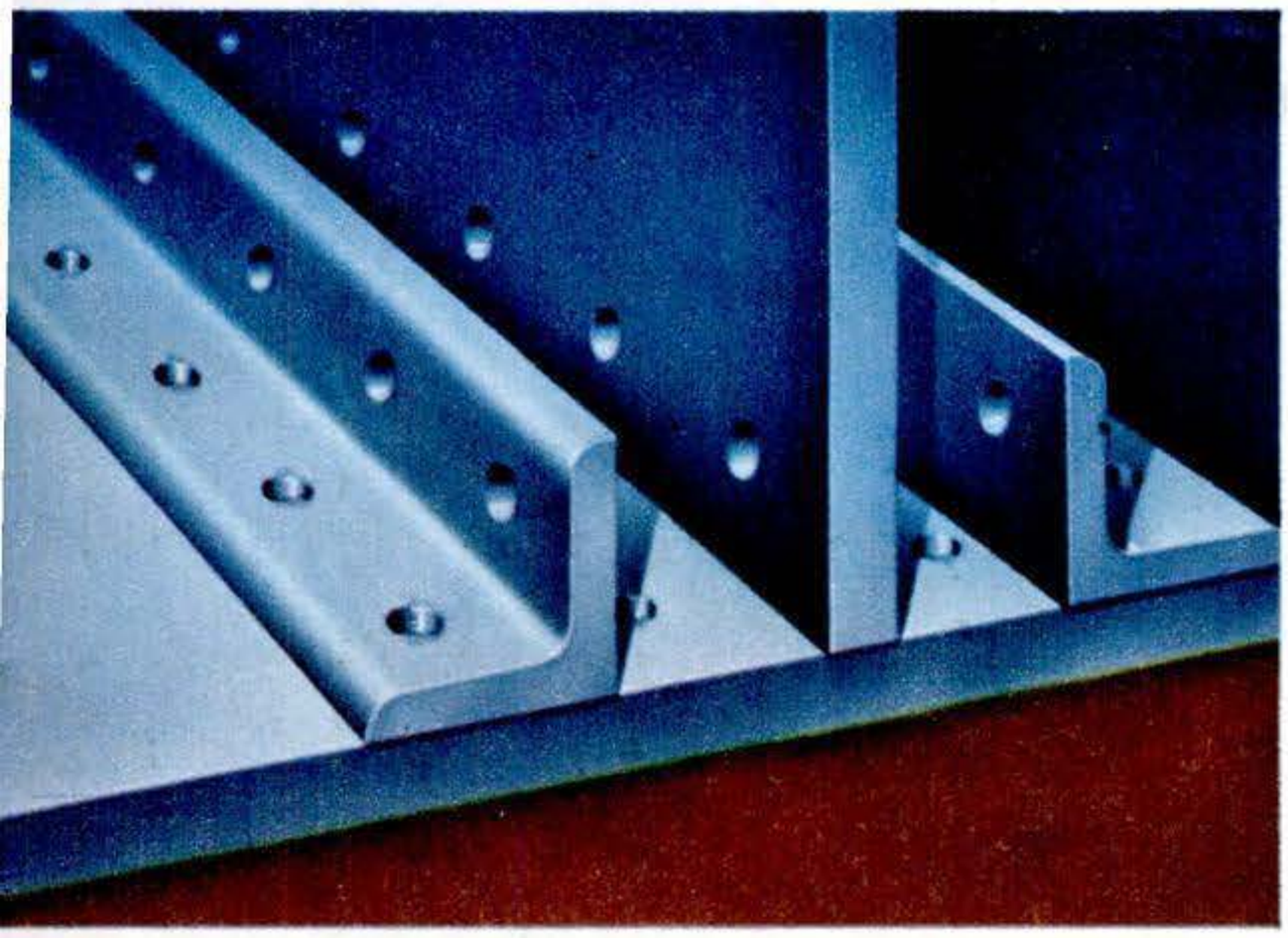
Copyrighted material



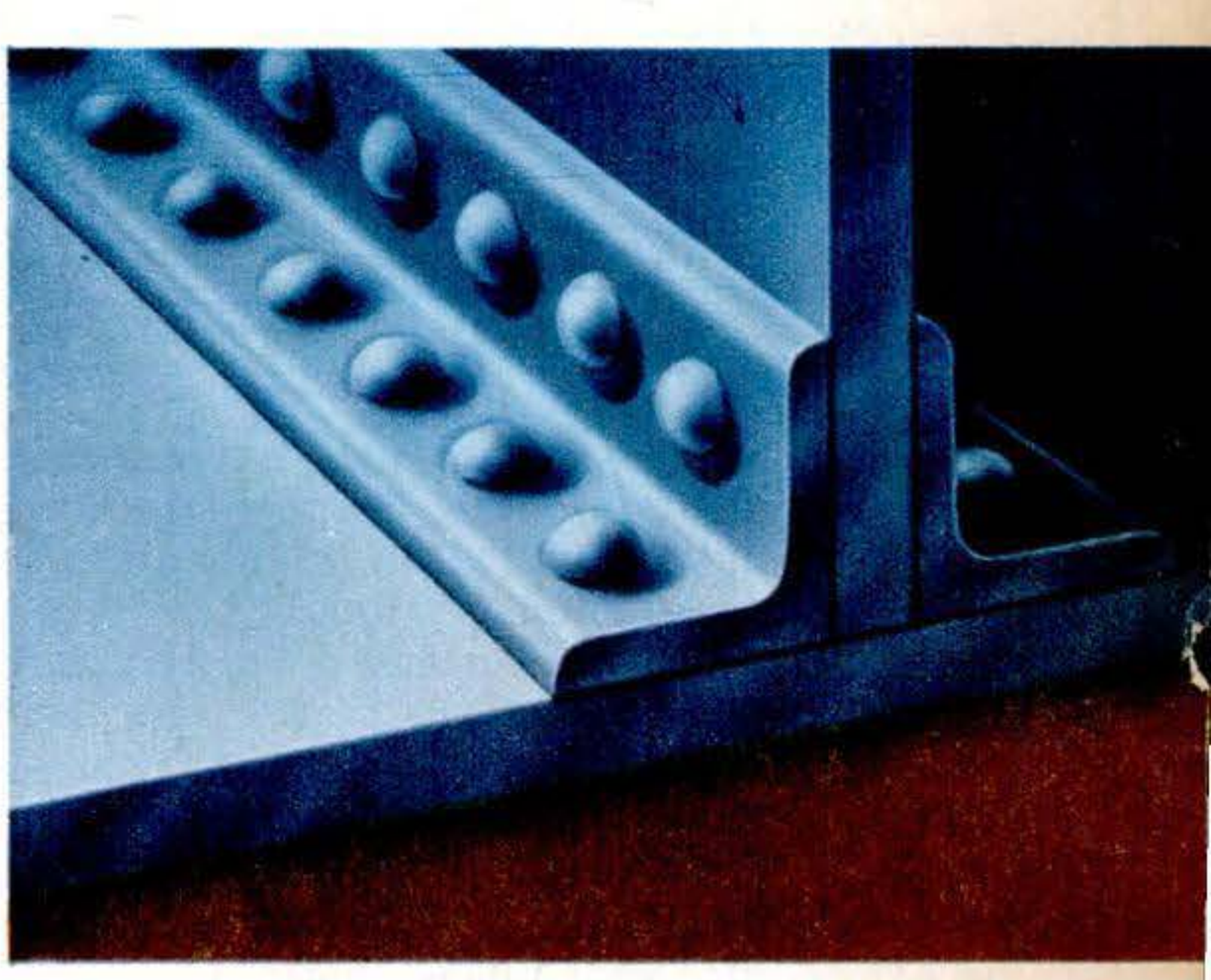
1. The load capacity of a beam depends primarily on its shape. When it is a solid bar, as above, about 1,600 lb. of material is required to support a 10,000-lb. load; much material is wasted.



2. Modern design methods remove the idle material from the solid bar. This results in the I-beam shown above. Useless material has been cut away, trimming the weight while maintaining the strength.

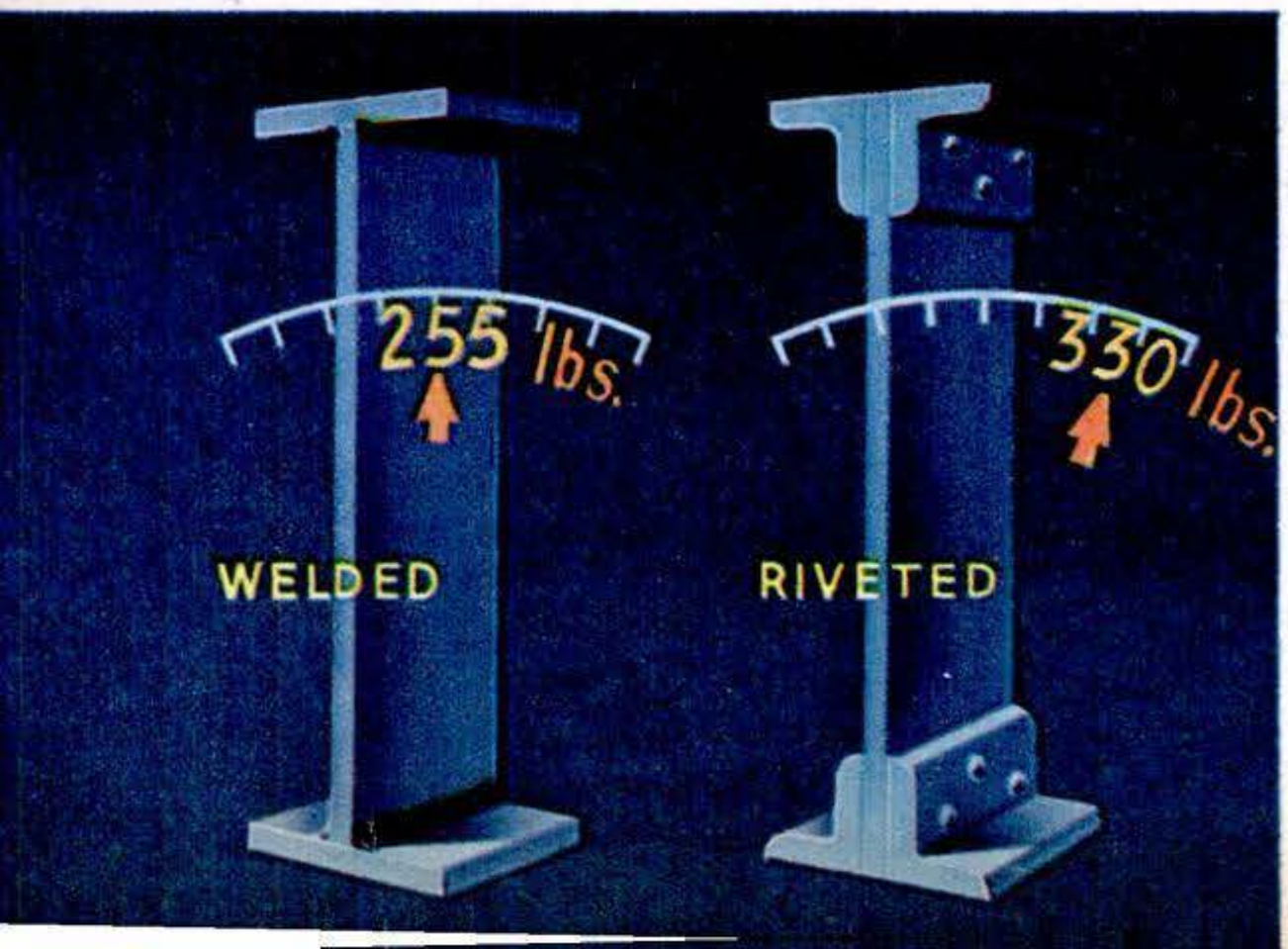


5. Riveting this simple girder requires a heavy web plate and flange angles. Punching rivet holes removes metal and weakens all parts; to offset this the section must be larger—and heavier.

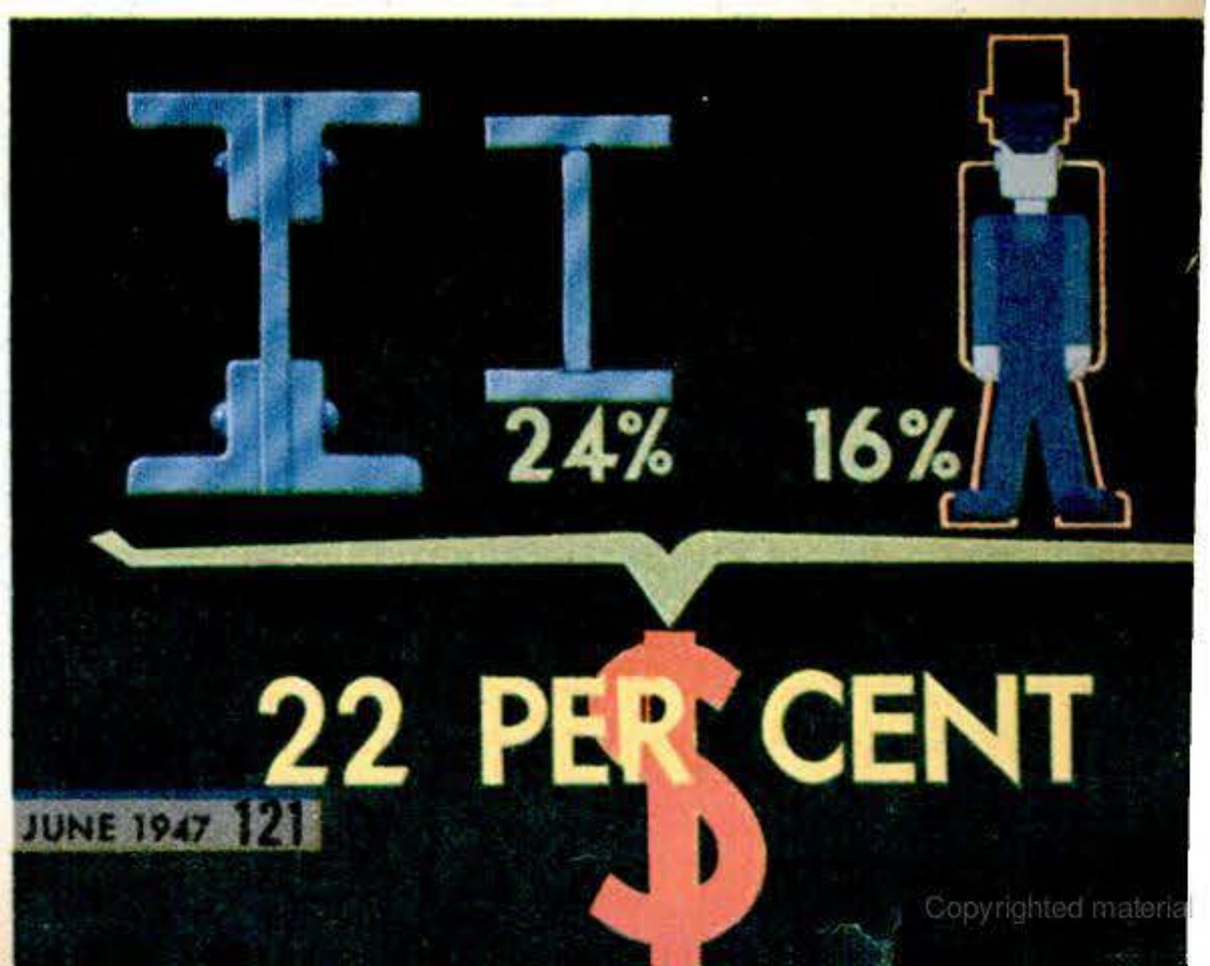


6. Joined and riveted together, the parts form a bulky, heavy union. By using some method that eliminates the riveting, the added weight can be avoided without decreasing the girder's efficiency.

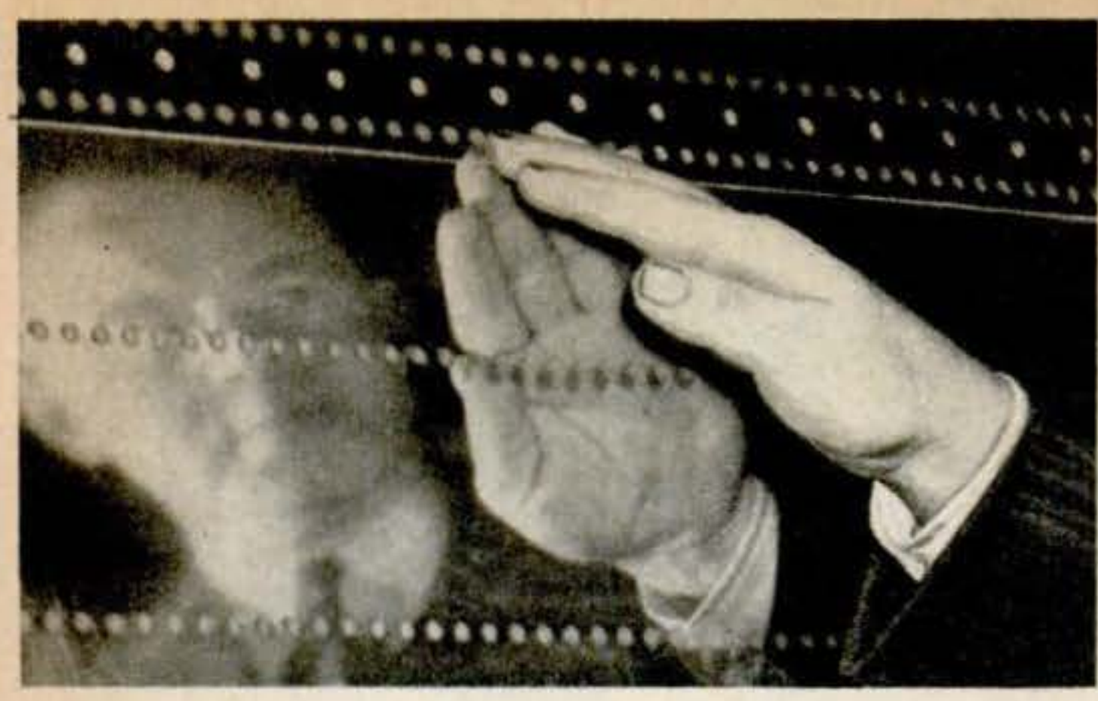
9. How do riveting and welding stack up for weight and material used? When stiffeners are added, each lineal foot of the riveted girder weighs 330 lb., against 255 lb. for each foot of arc-welded girder. One-quarter of the weight is saved.

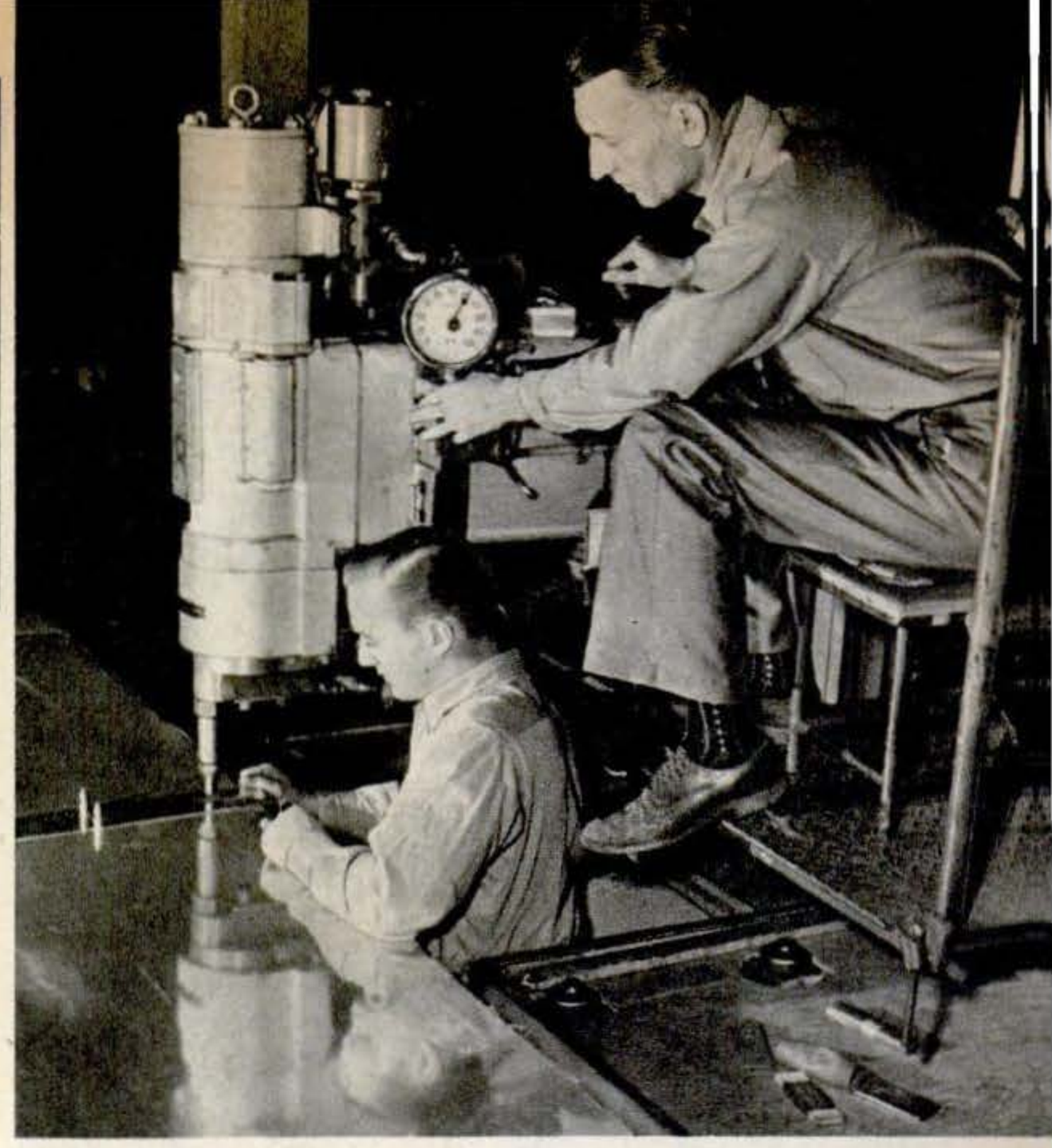


10. Including lower labor costs, the saving in dollars adds up to 22 percent. Similar weight and cost savings can be achieved by arc welding tension and compression members, either in standard structural shapes or in tubular sections.



Copyrighted material





Air Liners Shed Rivets

SPOT welding, in which two rows of welds equal the strength of three rows of rivets, makes Boeing's Stratocruisers smoother, faster and less costly to produce. At right is an automatic welding machine, electrically stitching carefully aligned sections of body paneling. Above, a finished section of the aircraft skin shows off its smooth surface in a "touch" test.

Lightweight Plastic Arm

AMONG the new prosthetic devices being developed to aid amputees is one engineered by Northrop Aircraft: an artificial arm that weighs less than two pounds.

Formed over a plaster cast as a light but rigidly strong plastic shell, the arm has wire controls similar to aircraft control cables, instead of the leather thongs formerly used to guide the metal hooks that serve as a hand. The photos at right show the arm partly assembled (bottom) and in use (top). For amputations below the elbow, the Northrop arm has a "rotating" wrist, operated by movements of the forearm, that contains a set of gears to increase the wearer's dexterity. The wrist can be locked in any position to lift heavy objects without danger of slipping.

The new arm is being distributed by the Rexall Prosthetics Service Center in Los Angeles, established as a model for other such centers throughout the country.

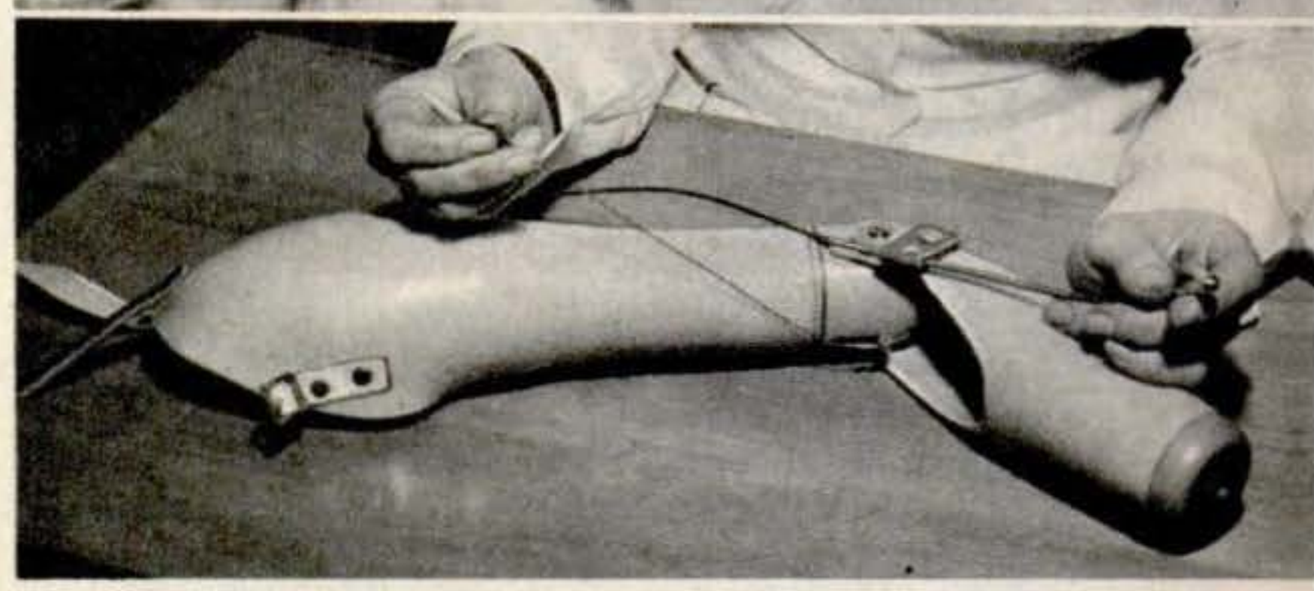


Photo Tube Is a Midget

DESCRIBED as the smallest photoelectric cell ever produced commercially, the tube shown at right is only one-quarter inch in diameter and little more than an inch long. Developed by RCA, it works just as bigger tubes do—reacting to light entering a window at its larger end—and is expected to find many industrial applications where space presents a problem.

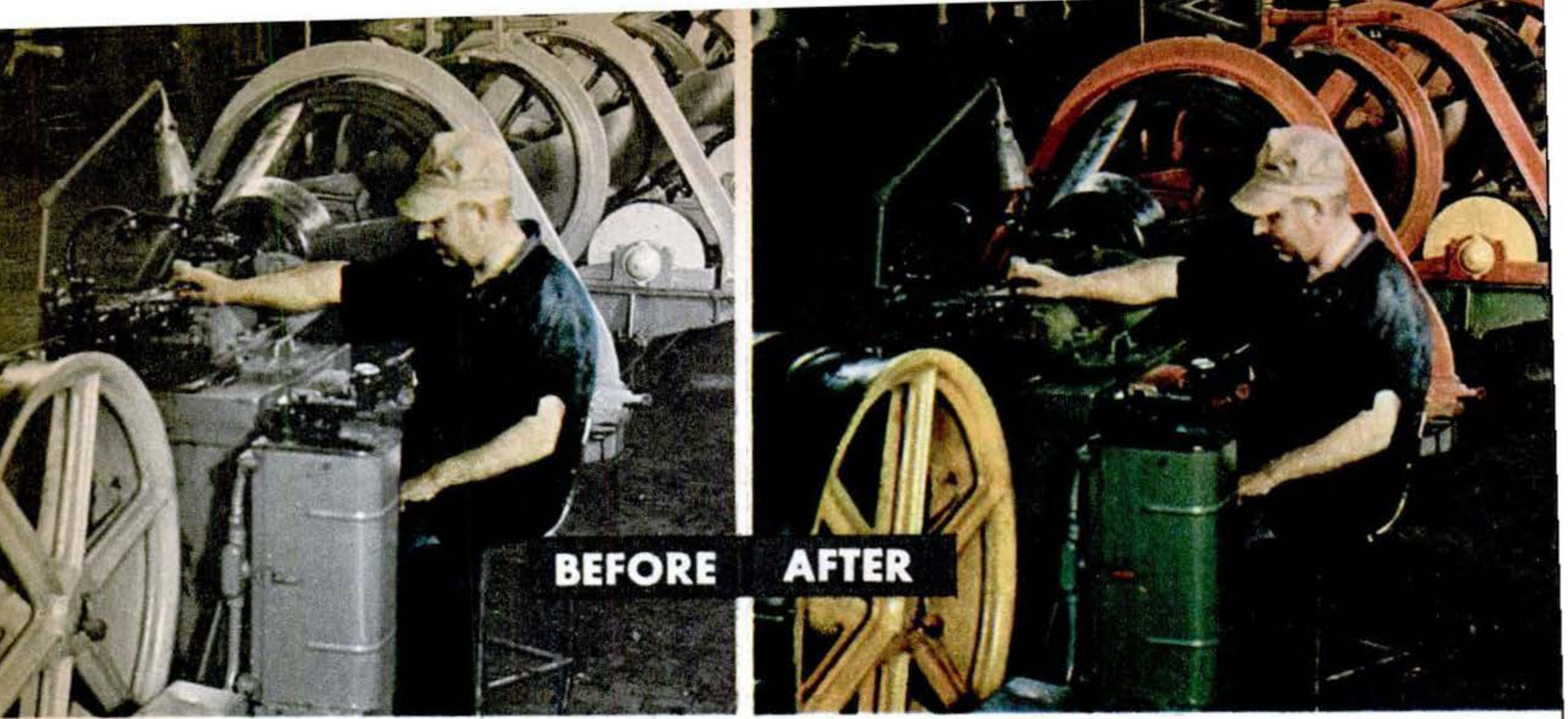
Safety Rides a Scaffold

JACK FRANKEL, a painter with a personal knowledge of the hazards of scaffolds (he was injured and his partner died when one gave way) has invented a device to eliminate those hazards. It is a viselike steel hand that clamps on a rope or cable. Fastened to a leather harness, it supports a workman if his scaffold breaks or slips. Pressing a release lowers the wearer to the ground, three feet at a time.

Turning the knob clamps a rope firmly in the grip, which is fastened by metal hooks to a harness like that of a parachute. The device supports up to 800 pounds and can even be used in place of a scaffold.

Above, Frankel demonstrates a "side-slip," made safe with his invention. At right, on the upper end of a slipping scaffold, he proves to the photographer that his device really can be a lifesaver.

Copyrighted material



This wire-rope machine shows how color can make machinery more attractive—and more efficient.

Color Punches the Time Clock

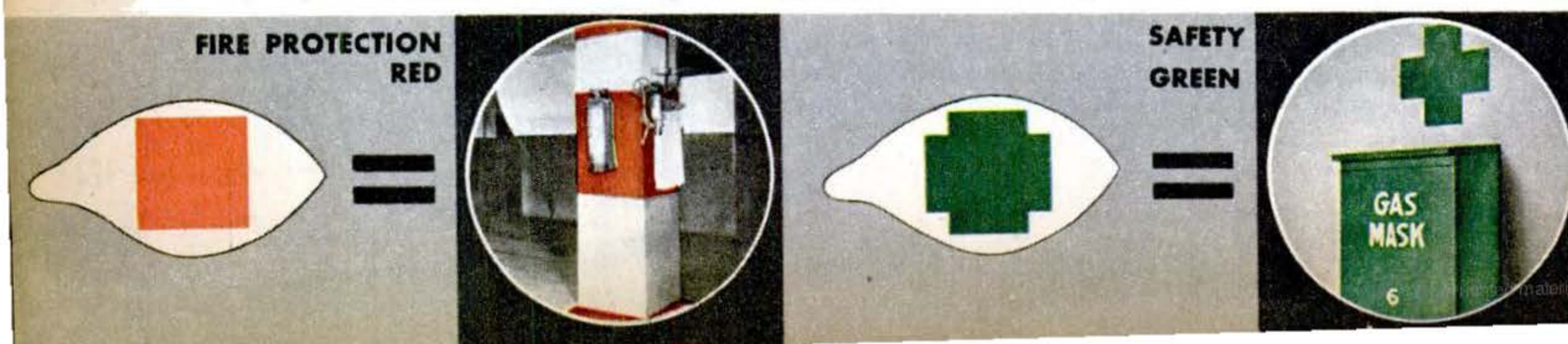
By Lloyd Stouffer

GIRLS in a carefully air-conditioned Mid-western factory complained of feeling cold, although the temperature was kept at a steady 72°. When the blue-green walls were repainted a warm coral color, however, their complaints ceased promptly. In another plant, workers lifting black metal boxes filled with rough-cut brier pipes complained that they strained their backs. One weekend the foreman had all the boxes painted a pale green. On Monday several men said to the boss: "Say, these new lightweight boxes make a real difference."

Such evidences of the deceptive and persuasive powers of color are not new to science. The average person will underestimate the temperature of a blue room and overestimate the temperature of a red room, and will judge dark-colored objects to be heavier and light-colored objects lighter than they really are. In the last 10 years, with the growth of a new profession called color engineering, these and other color phenomena have been put to practical work on a broad scale.

The idea that colors on the red side of the spectrum are warm and stimulating, while those at the opposite blue-green end are cool and relaxing, is accepted as a rule-of-thumb by all color practitioners. In a

Du Pont's Safety Color Code is used to tag industrial equipment for safety and good housekeeping.



Color works for a living in industry, in public health and in salesmanship.

Dark box seems lighter when painted light green.

Navy's change to white shirts foiled mosquitoes.

Red speeds customers' choice, booms premium gas.

chain of restaurants, waiting lines formed outside telephone booths. When each booth interior was painted bright red, conversations speeded up so that the signs asking users to be brief were removed.

Another group of restaurants in New York adopted their striking red-and-yellow color scheme on the advice of a color consultant. Originally a chaste gray-green, the restaurants were popular, but patrons were inclined to linger and the turnover wasn't fast enough to suit the management. When the decorating was changed to stimulating colors, traffic speeded up and business increased.

Tests have established that red seems to have the edge in any selling job where a snap decision is involved. Howard Ketcham, a leading color engineer, was asked by a large oil company to try to increase the sales of its premium gasoline by changing the color scheme of its filling stations. Experimenting with a Brooklyn station, Ketcham used green and white everywhere except on the premium gasoline pump, which he painted a brilliant red. Sales for the redecorated station as a whole promptly went up 15 percent—and the premium gasoline pump sold 50 percent more than formerly.

While red impels to action, green—the color of nature—seems to promote a sense of well-being. Blackfriars Bridge, in London, was notorious for suicides. When its black ironwork was repainted bright green, suicides from the bridge declined by more than one-third.

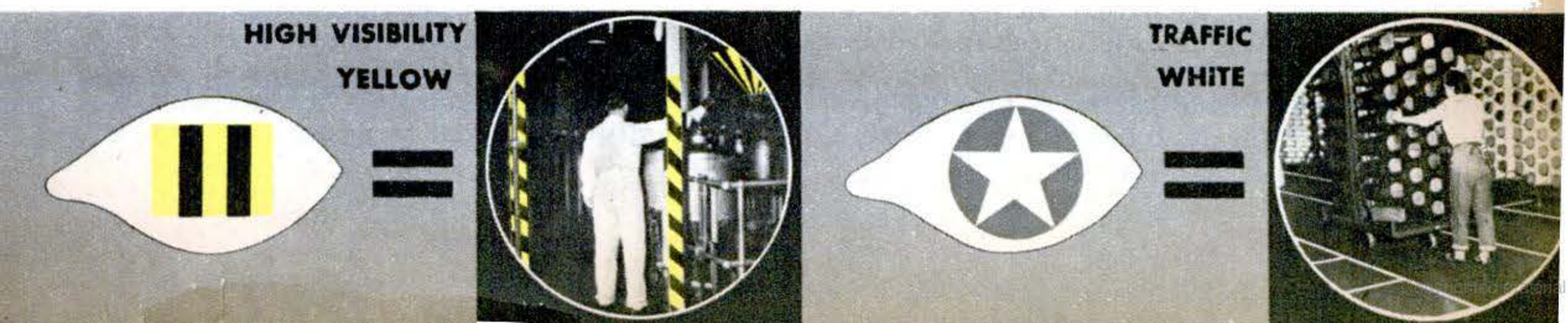
Though most animals, including bulls, are color-blind, color has its effects on certain insects. Blue appears to be repugnant to flies. Recently a Chicago cheese manufacturer painted a large factory window blue, to screen out the sun's ultraviolet rays; it was discovered incidentally that flies no longer congregated outside this window, although they were as thick as ever around other windows. Mosquitoes, however, seem to like blue. During the war the Navy withdrew blue shirts from men working at shore installations in malarial districts and substituted white, after tests showed that the incidence of mosquito bites was considerably higher among men wearing blue.

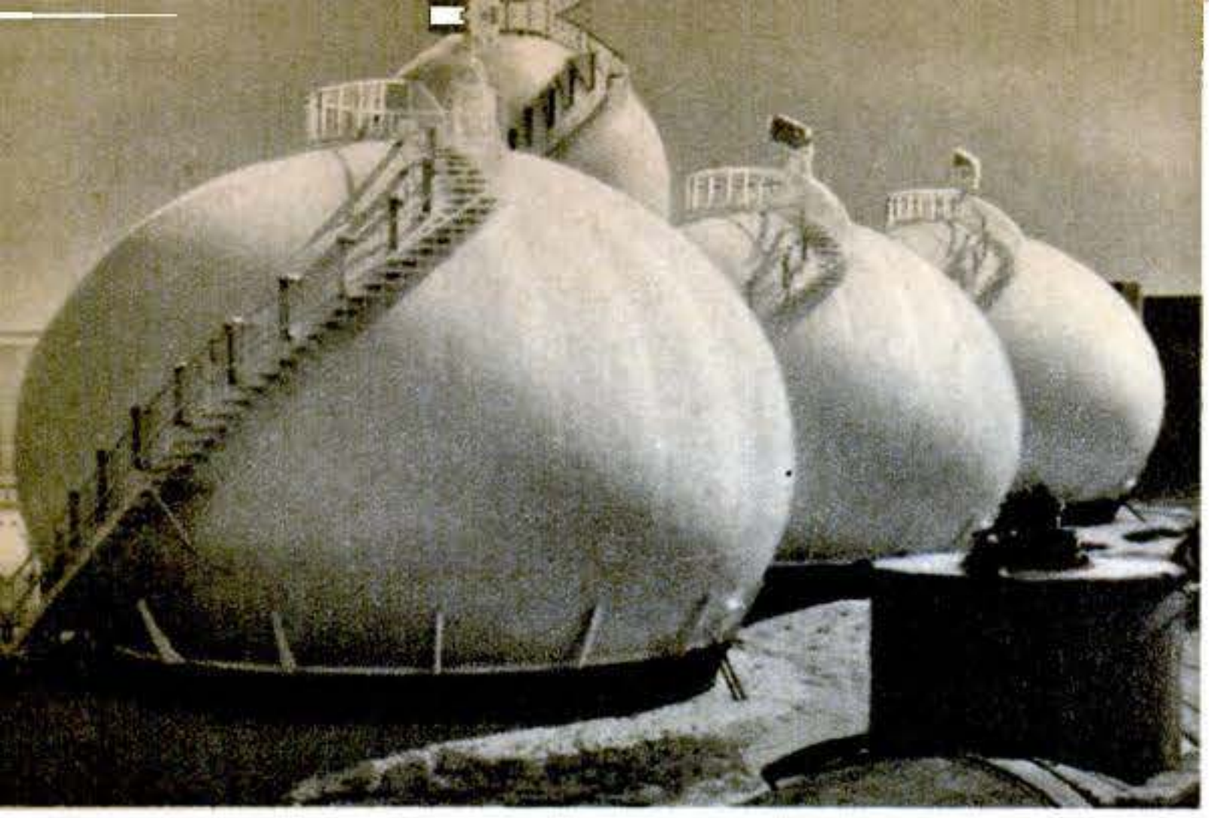
Bugs and Barnacles

Mosquitoes and other night-flying insects are also repelled by a new deep-orange electric light bulb for outdoor illumination.

Ship owners stand to save millions of dollars because of the discovery that barnacles, the marine organisms that foul ships by attaching themselves to hulls, are color-conscious. Experiments by the Scripps Institution of Oceanography show that barnacles are particularly fond of the dark colors customarily used on ship bottoms,

Used in many Army units, Color Code also employs symbols for the benefit of color-blind persons.





Painting fuel tanks with special pigment—Du Pont's Dulux White—lowered temperatures and increased yearly capacity by cutting evaporation losses.

and settle in far fewer numbers on a surface painted light green or white—a simple way to decrease American shipping's $100,000,000 annual "barnacle bill."

Wartime experience developed a complete color program for industry, with results so impressive that hundreds of factories are taking it up. Here the purpose is not merely to stimulate or soothe the worker, but to increase visibility by means of color contrast and more profitable use of illumination. Factory managers report production increases of 15 to 30 percent, which they attribute solely to the scientific selection of the proper colors in routine factory painting.

The typical steel-working plant has the bodies of machines painted a light "horizon" gray, while working areas are a cream color, to make the steel being worked on stand out in three-dimensional contrast. The ceiling is white, and the walls and supporting columns, up to a height of about eight feet, are a soft gray-green. The floor may be a light buff or gray. Fire-fighting equipment is painted red; first-aid boxes, green. Hazards—low beams, edges of platforms and pits, crane hooks and lift trucks—are yellow striped with black; switch boxes and levers, blue.

Saving Illumination

The over-all effect of this industrial color scheme, fathered by color engineer Faber Birren, is harmonious and pleasing. But it has nothing to do with aesthetics, is strictly functional. Data show that with this use of color it is possible to recover light otherwise wasted and increase the actual illumination 100 percent without changing the lighting equipment or increasing the wattage. The Cambridge Instrument Co., of Ossining, N. Y., says that as a result of color-conditioning it experienced immediate gains of 15 percent in production and 40 percent in accuracy—along with a 60 percent decrease in absenteeism. And workers take more pride in caring for equipment.

A large Detroit firm reported that in 60 days it had saved, through recovery of small parts formerly dropped and swept away, enough to pay for the painting.

Accident rates in newly color-conditioned plants usually take a sharp drop and stay down. Typical drops reported range from 20 percent (Tulsa Boiler & Machinery Co.) to 40 percent (Bliss & Laughlin, Inc., Buffalo, makers of metal-working machinery). Frequently eyestrain, which can create dangerous fatigue and nervous tension, is the result of constant, involuntary adjustment of the eye muscles caused by wrong color contrast, or distracting, glaring horizon colors, even where there is sufficient light.

In the inspection room of a North Carolina textile mill, girl operators scan blue denim hour after hour, as it moves rapidly under their eyes. Thinking to provide the maximum light, the operators of the mill had painted the walls of the room white. But when the girls looked up momentarily from the blue cloth to the white wall for a rest, a peach color swam before their eyes.

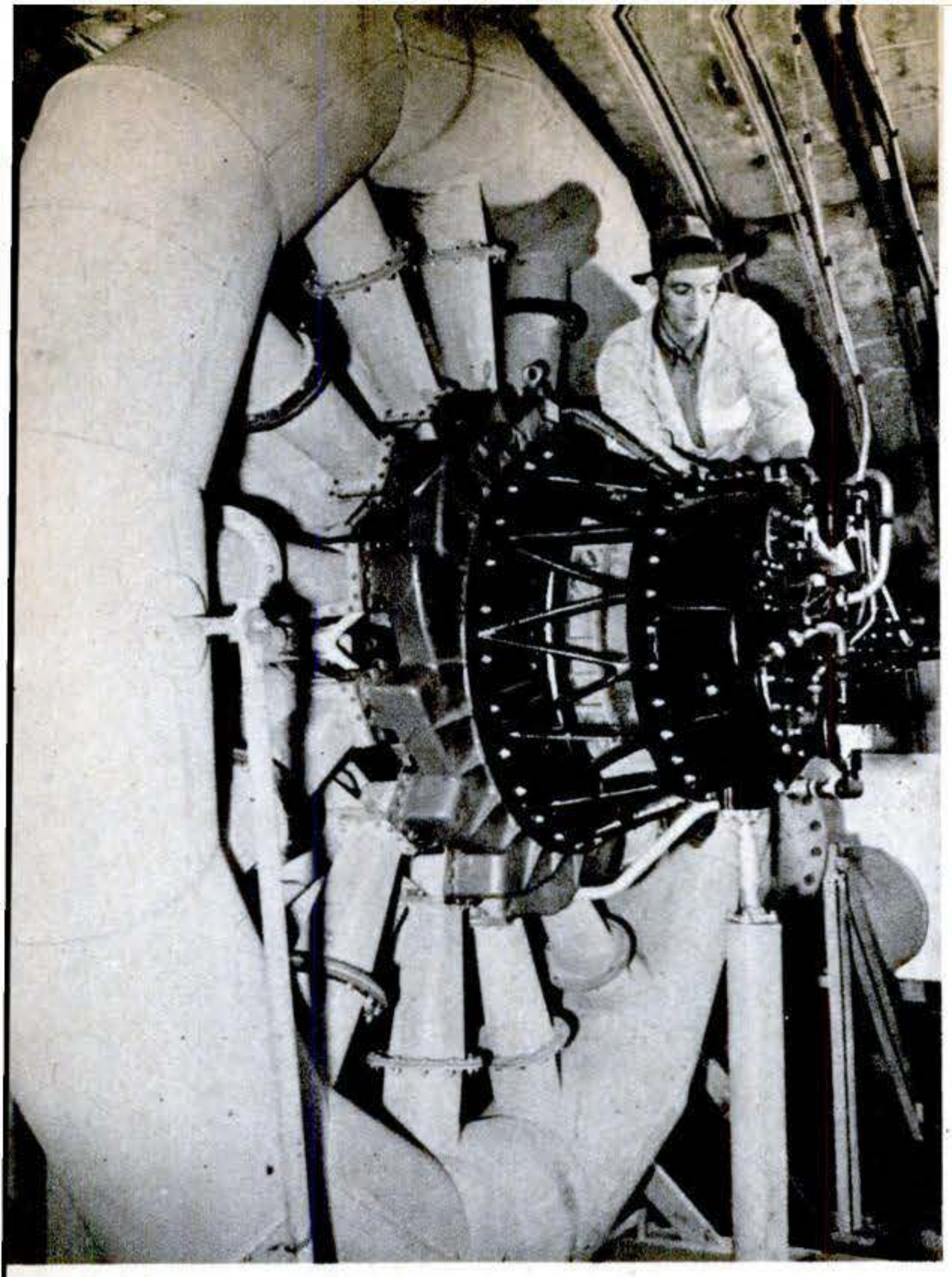
The Eye's Defense

This is the visual phenomenon called "after-image": The human eye, overstimulated by one color, registers the opposite or complementary color as a means of readjustment. When the girls looked back at the work, it took them several seconds to regain normal vision. A color engineer greatly increased the time the girls could work effectively and without strain at this job by providing what their eyes demanded: peach-colored walls.

Color engineering performs some of its most powerful functions not with bright hues, however, but with pure black and white. Here the effect is strictly physical, based on the fact that black absorbs heat and white repels it. The Beech-Nut Packing Co., at Canajoharie, N. Y., paints the black tar roof of its plant white each spring with a short-lived water emulsion paint, lowering plant temperatures through the hottest part of the summer by several degrees. By the time cold weather comes, the white paint has weathered off and the plant gets the full benefit of the heat-absorbing black roof. And heating engineers have found that a five-coil steam radiator painted white will produce as much heat as six coils painted a dark or metallic color.

The basic principles of all colors have been known to us ever since Sir Isaac Newton looked through a glass prism and discovered the spectrum. But because we have been blinded by color's aesthetic appeal, we have overlooked its amazing powers, and only recently have put it to work. END

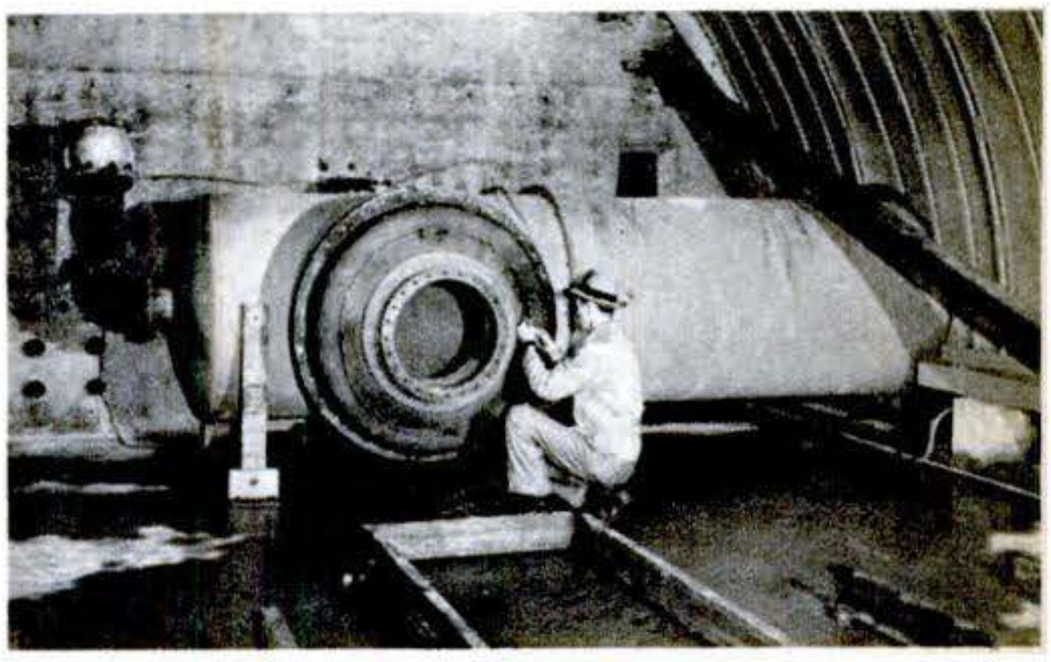
Copyrighted material



This modified I-40 jet engine, steam operated, is being checked before being used to compress air for operation of the ram-jet engines.

Steam Runs Jet

MAN'S first artificial power source has been put to work running his latest engine. Steam has been piped into the Boeing plant at Renton, Wash., and operates a modified I-40 jet engine. The jet in turn compresses air to produce a stream, traveling at supersonic speeds, used for laboratory testing of high-speed ram-jets, part of an extensive AAF program on new power plants. Combustion testing is conducted in a special "thermodynamic" wind tunnel. The steam comes from a 107,000-horsepower steam electric plant near by.



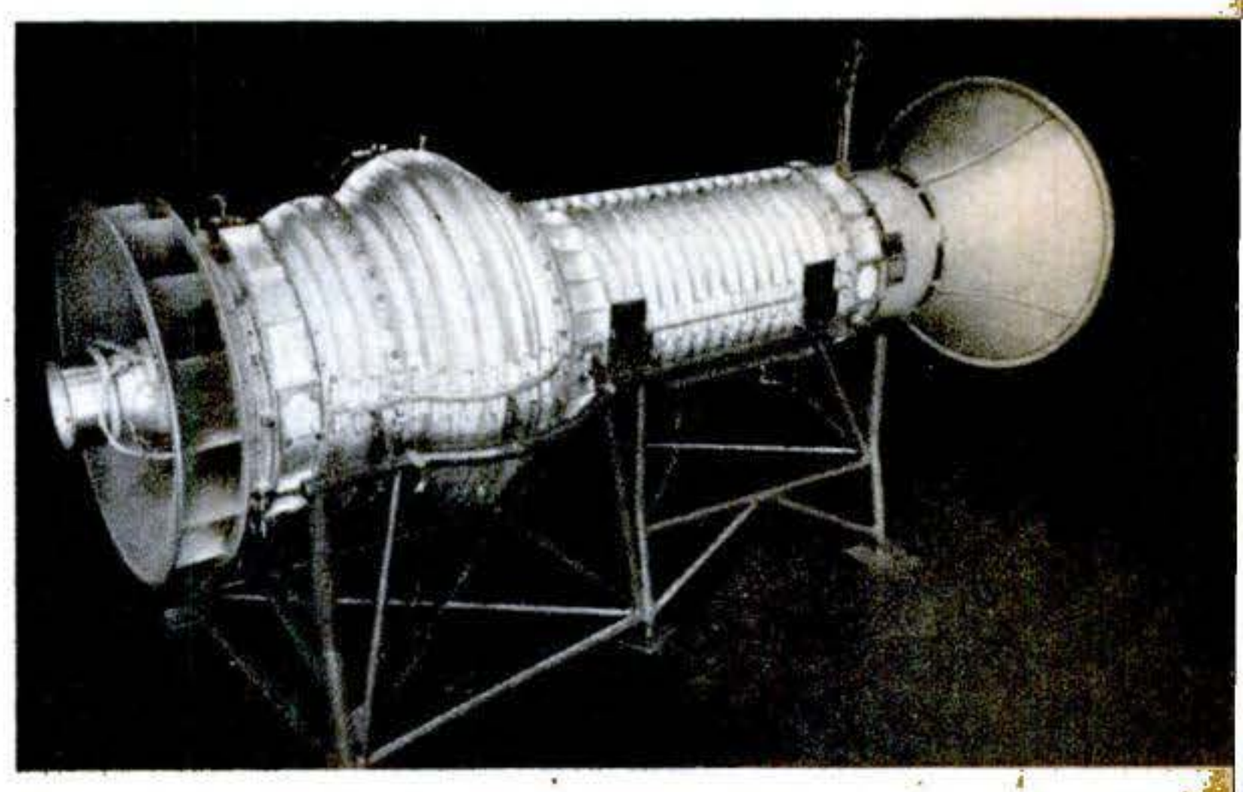
In the test cell, workmen give final touches to the duct that carries supersonic air stream to experimental ram-jets undergoing tests.

Turbodyne

THIS slender engine, the Turbodyne, is said to deliver the greatest thrust ever created by a gas turbine. Built for the AAF by the Northrop-Hendy Co., of Hawthorne, Calif., it is part of a seven-year research project that until now has been secret.

The Turbodyne is designed to run about 500 hours with the temperature at the nozzle blades 1,400° F., operating with a combustion efficiency of 94-96 percent and a compression ratio of seven to one. At lower speeds, it will run 10,000 hours. As the engine turns faster than 10,500 r.p.m., a centrifugal force of 20,000 Gs is developed.

The air is sucked in and compressed by more than 1,000 blades, shaped like airfoils, mounted on one end of the main shaft. The air then moves at high pressure to the center of the engine, where it is mixed with fuel. The engine burns a variety of fuels, including kerosene, 100-octane gasoline and pulverized coal. The fuel-air mixture ignites like a gigantic blowtorch, its fiery blast driving against the turbine blades to spin the shaft.



Air enters bell-like mouth at right and is compressed by hundreds of tiny blades. It is then mixed with fuel in the combustion chamber—the bulge just left of center. The turbine spun by the fiery mixture is at the extreme left. Projecting from the intake are pressure tubes and temperature indicators, used in checking the engine during tests. The shaft extends through the engine.

Studies of the possible use of the Turbodyne to power locomotives are now being made by the Northrop-Hendy Co. in cooperation with the Union Pacific Railroad.

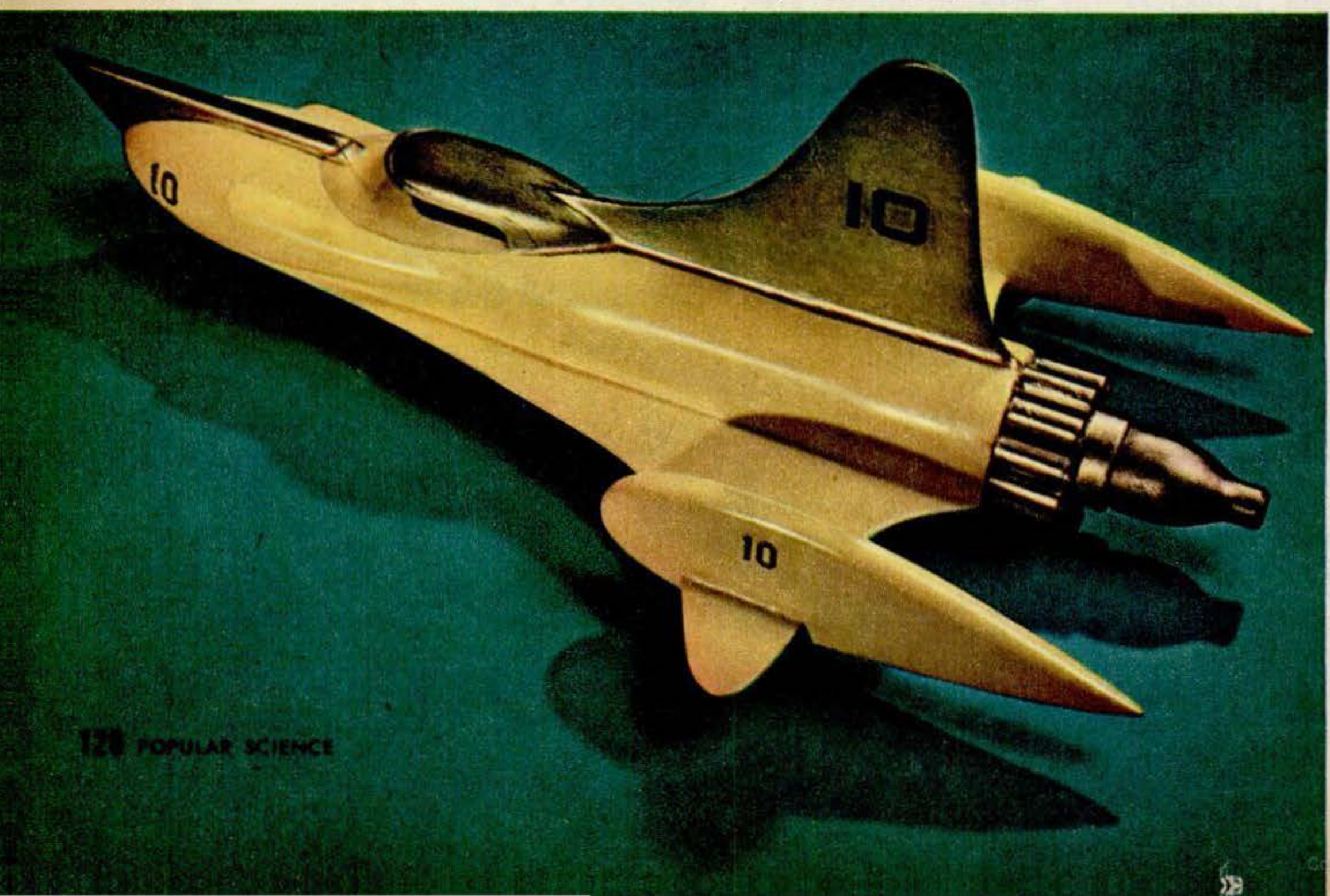
Copyrighted material

CRAFTWORK

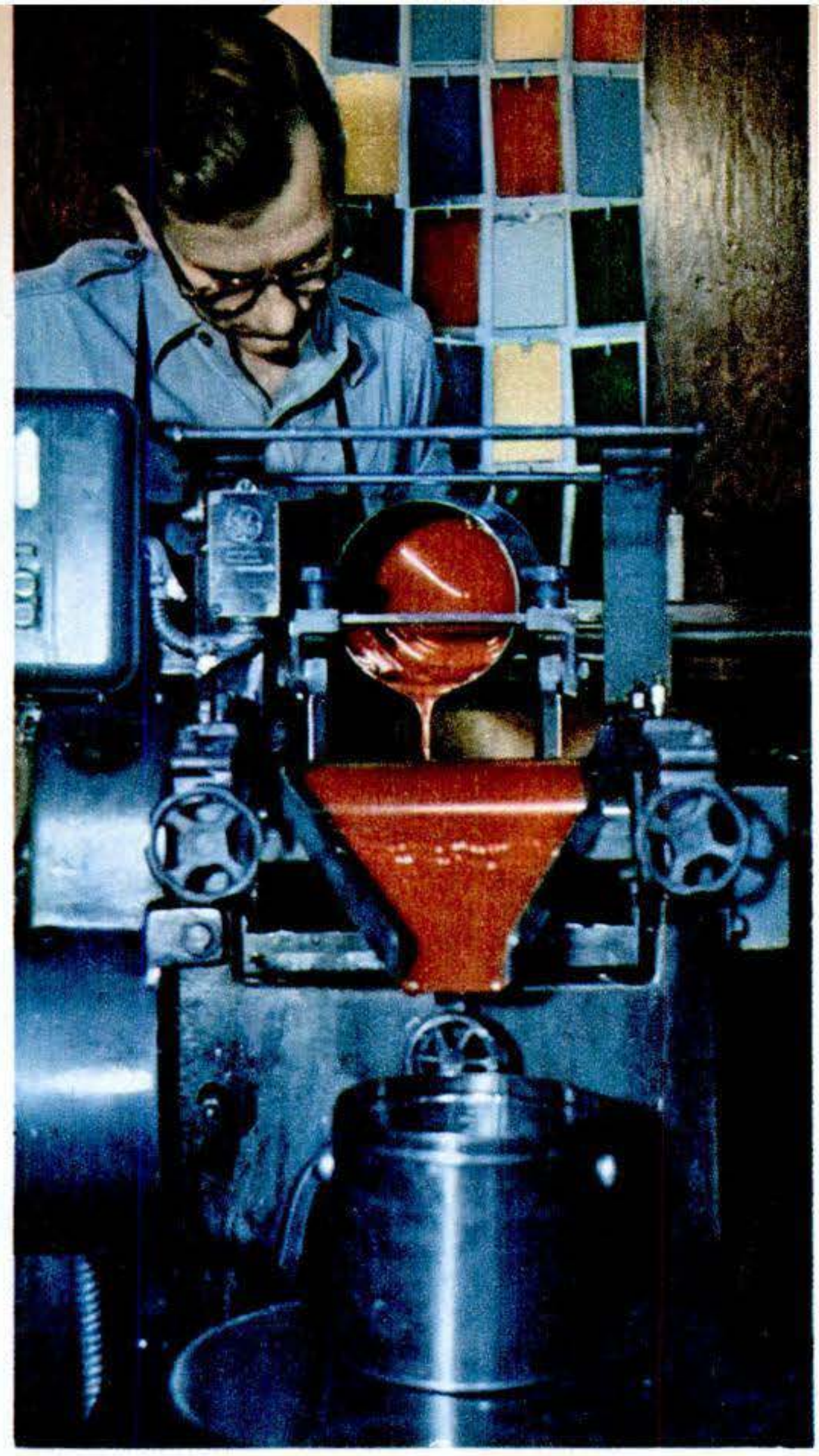
PROJECTS OF THE MONTH

RUBBER-BAND CHAMP. Put your name on this plane before you let it take off, because the *Chieftain* may well fly out of sight. Its sleek fuselage is made of hollowed balsa and houses a retractable landing gear; a counterbalanced prop folds back for a smooth, flat glide. If you want to see thrilling performance on rubber-band power, build this sleek, clean-lined job from the plans beginning on page 170.

MINIATURE JET CAR. Carbon dioxide cartridges that put sparkle and life into soda-water siphons also pack a completely different kind of excitement. Such a cartridge is tucked into the tail of this otherworldly car. When it is punctured to let the gas stream out, the escaping jet will rocket the tiny balsa racer at speeds up to 50 m.p.h. If you'd like to try whizzing on fizz, turn to page 166.



Copyrighted material



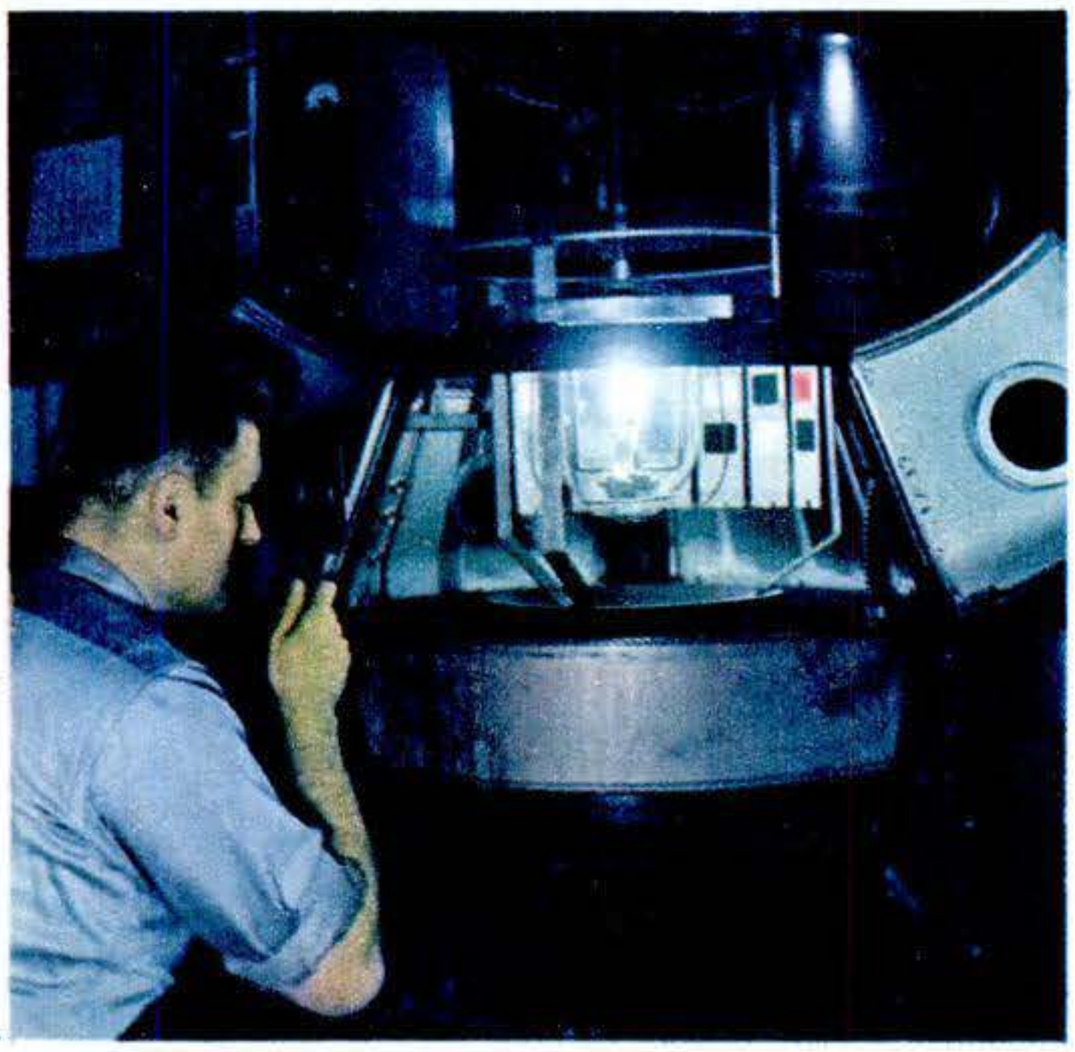
A laboratory technician operates a three-roller paint mill to grind pigments for an A-resin product. Resin is the family name for the principal film-forming ingredients in varnishes and enamels.

New Paints from Oil

ORGANIC chemists are the Scotchmen of science. They won't waste any raw material, especially if it is cheap. The latest reward of their ingenious frugality is a new resin for paints, made from the petroleum hydrocarbons that were a basic ingredient of wartime synthetic rubber.

Called A-resin by Esso Laboratory chemists who developed it, the new synthetic makes paints, enamels and varnishes reported to be superior in some respects to existing finishes. They stick well to almost any surface, even highly polished metal. A-resin paints will not flake off, the makers assert, pointing out that a knife scratch pulls pieces of metal away with the paint.

In other characteristics, A-resin paints are also said to rank high. They resist soap and water, withstand weathering, and are not dissolved even by acid grapefruit juice;



Checking test samples of A-resin finishes in a Fade-Ometer, which gives accelerated ultraviolet light and heat breakdown of paints and varnishes, simulating the effects of natural sunlight.

Supplementing the ultraviolet test, experimental panels are subjected to actual weather exposure to see how well they stand up. A-resin finishes are said to dry quickly and provide a lasting gloss.

Copyrighted material

these qualities are expected to make them useful for coatings for food cans (which must be unaffected by stamping operations and by the acidity of their contents) and for the priming coat on autos. Of major interest to paint manufacturers is the fact that A-resin is a "short-oil-length" resin; it requires mixing with only small quantities of drying oils, such as linseed or tung oil.

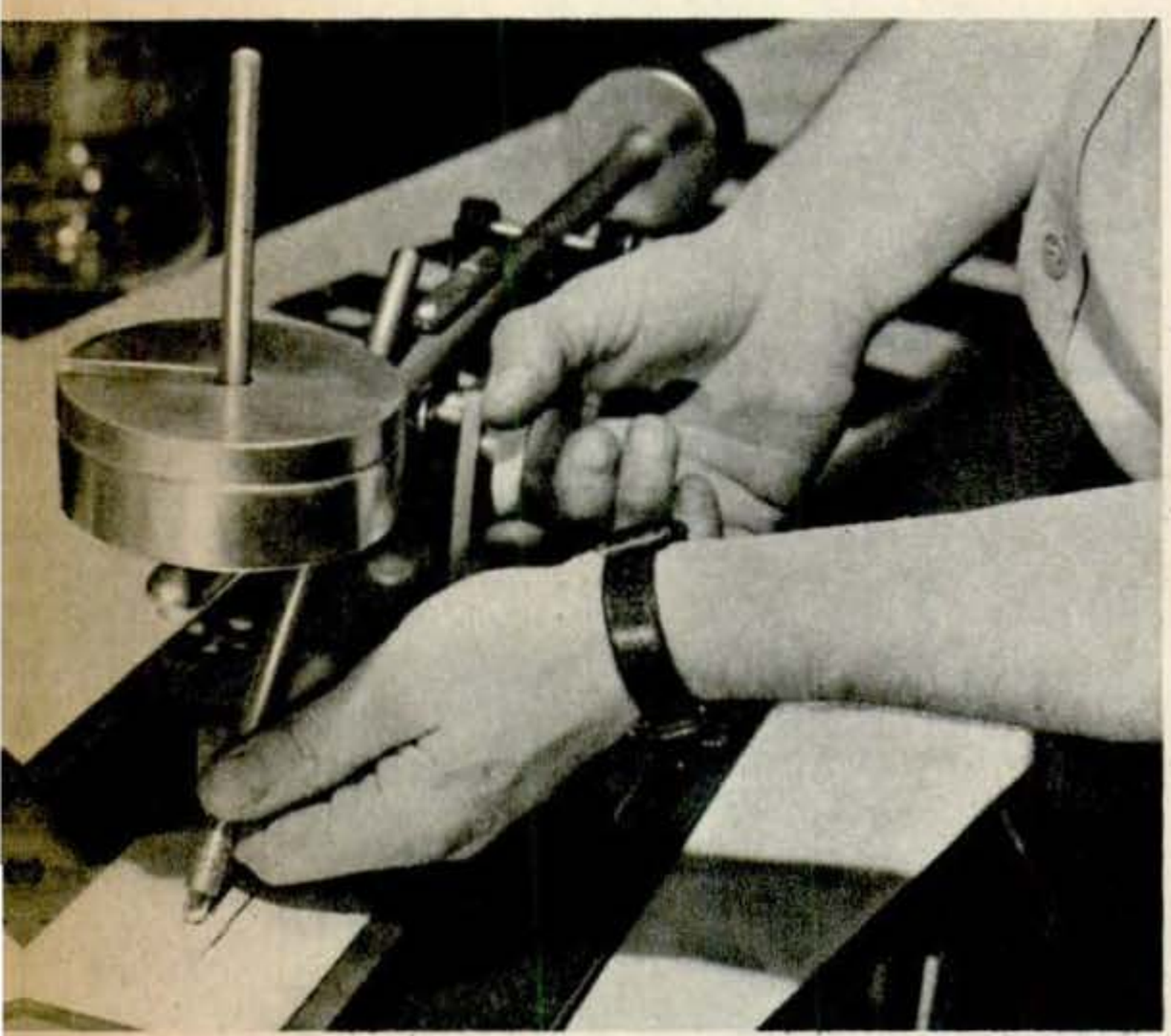
A-resin enamels may find wide use for such everyday jobs as refinishing furniture. They dry quickly, leave no brush marks, and are expected to be fairly low in cost.

Atomic Architecture

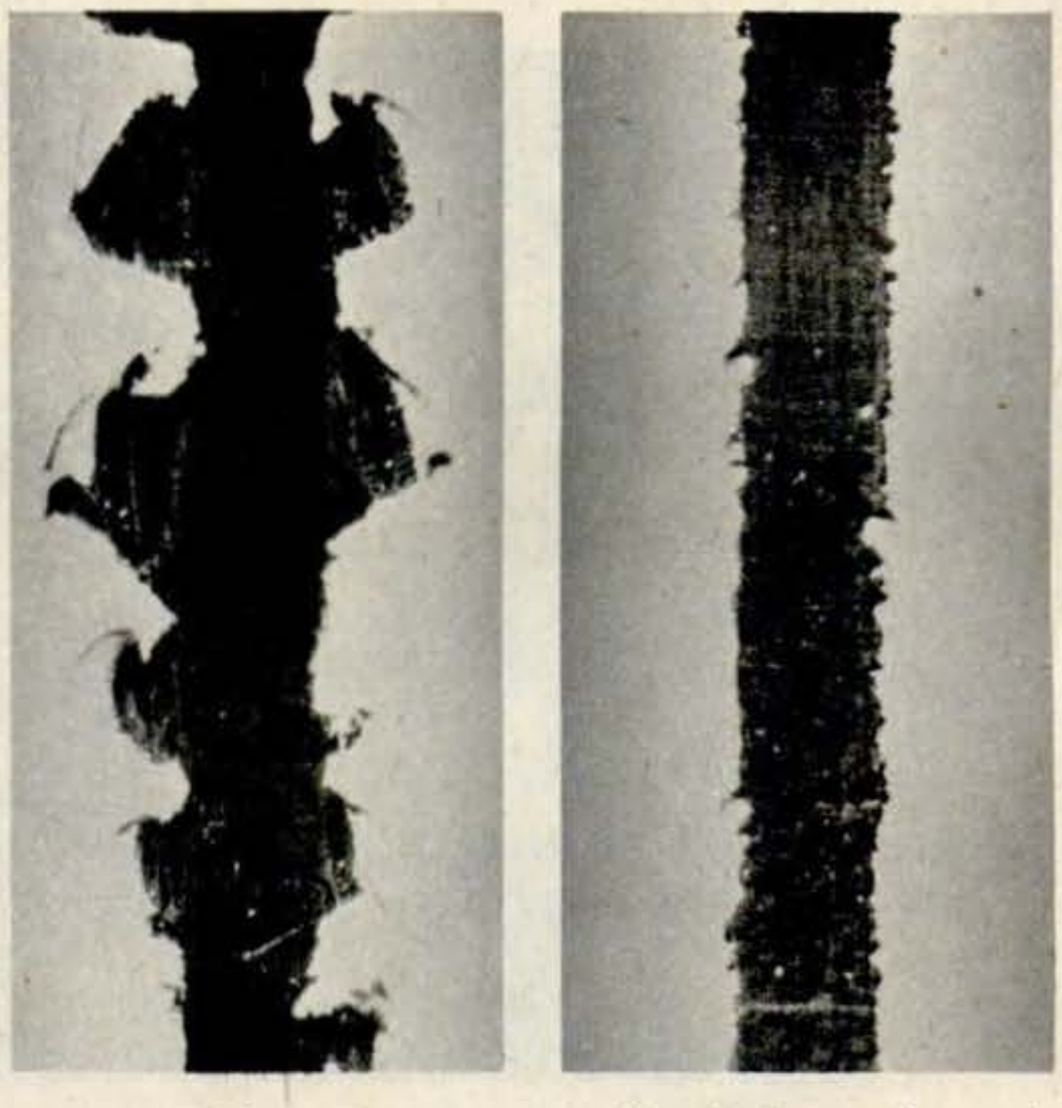
Back of this development are several years of atom-juggling based on previous experience at changing oil into almost anything man can use. Starting with pure hydrocarbons (compounds containing only the elements hydrogen and carbon), chemists had already rearranged the atoms and the connections between molecules to make rubber.

The researchers went back to the same raw material — hydrocarbons — and once more rearranged atoms and linkages. This time they wanted not a soft, stretchable material like rubber, but something hard and brittle. It would have to be insoluble in water, but soluble in certain hot oils. More important, it would have to dry into a tough, lasting film. The result of this atomic architecture, A-resin, is soon to be produced in experimental quantities at a pilot plant in Bayway, N. J. END

A chunk of A-resin, placed on a dictionary page, indicates the synthetic's purity. This gives it the light color required by paint and varnish makers.



A scratch hardness tester measures the resistance of dried paint and varnish surfaces. Comparative results obtained with ordinary enamel and its A-resin equivalent are shown in photo at right.



Magnified scratches on equally thick coatings of two enamels show the flaking of ordinary enamel, on the left, and emphasize the greater adhesive properties of the A-resin product on the right.

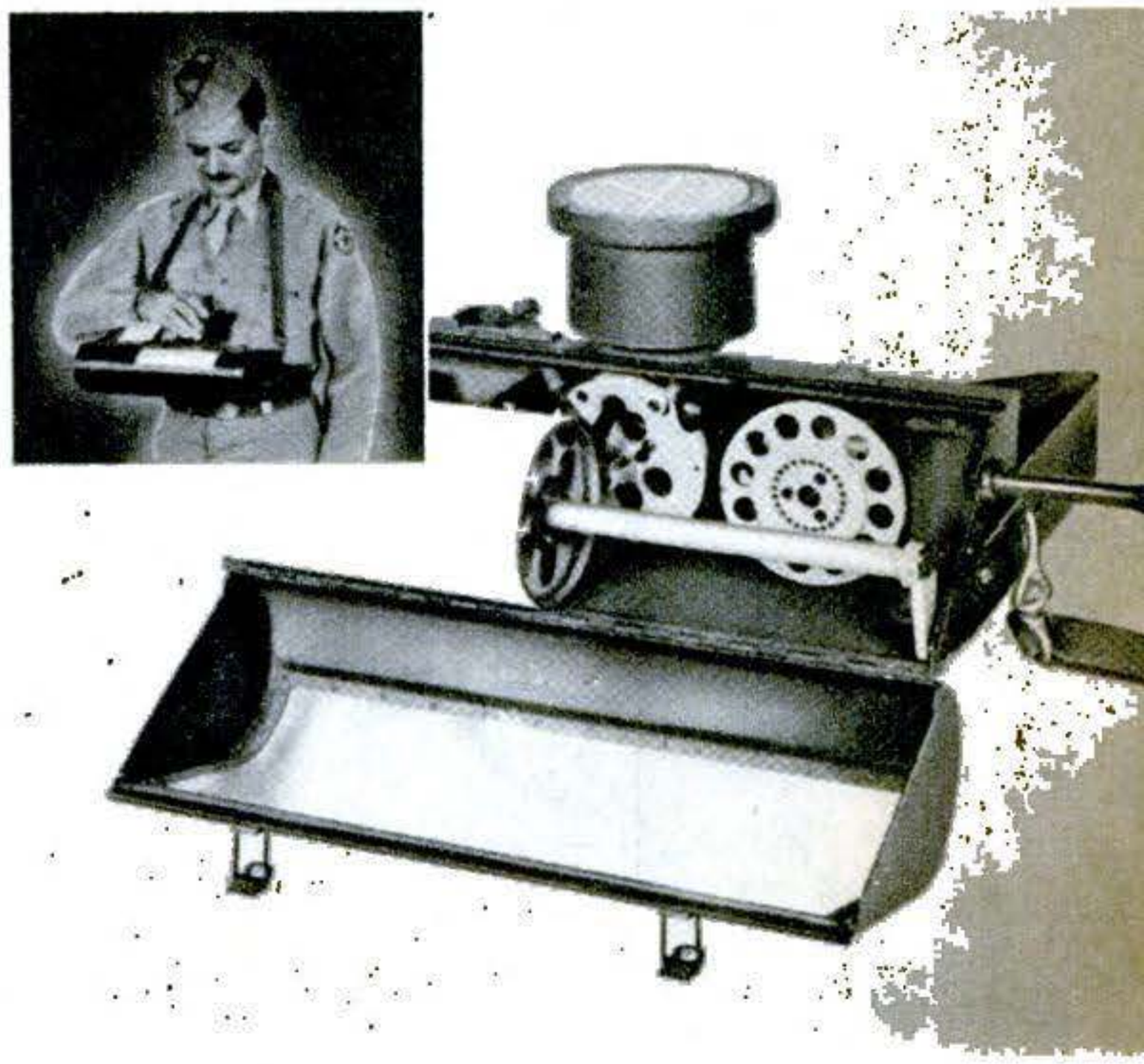
Copyrighted material

Mine-killing Snake

THIS rocket-headed "snake," slithering across the water at 90 m.p.h., is a mine killer. Launched from an assault boat, it swooshes to an enemy-held beach, climbs onto it—and blows itself up. The blast from its 45-foot, explosive-packed tail (most of it hidden by smoke in photo above) sets off any enemy mines planted on the beach to keep attackers from landing there. Similar rocket-powered devices have been developed, also by the Army Engineer Center, Fort Belvoir, Va., for use ashore.

Spike Detector

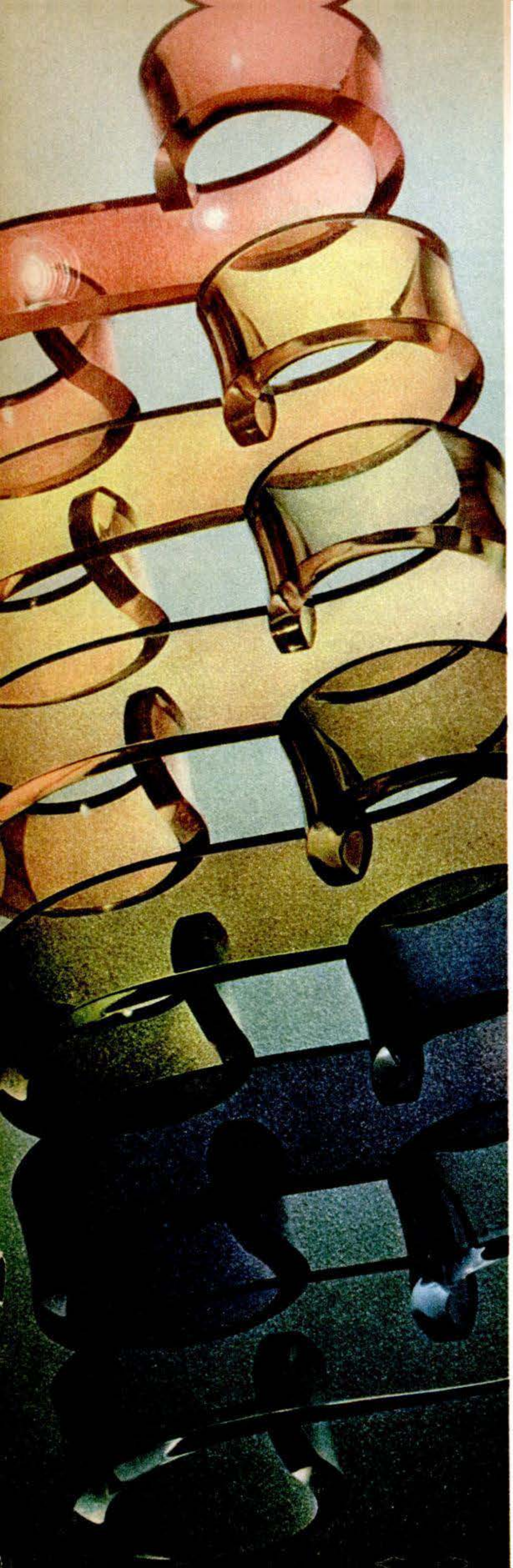
THE veteran mine detector has a civilian job—ferreting out nails in logs. Saboteur-driven spikes splintered dangerously when they hit the saws of R. T. Mitchell's mill at Logansville, Ga., so he obtained special authority to buy a detector.



Logs Walkers' Course

WITH this pedograph slung around his neck, a man always knows where he is and where he's been. Developed by Army Engineers for marching troops, the device makes a continuous record of directions and distances traveled. Close-up shows details.

Copyrighted material



Dipping Clear Plastic into the Rainbow

CRYSTAL plastic has a beauty peculiarly its own, but the craftsman can now dip into the dyemaker's palette to give it any hue he wishes. Lucite, plexiglas, cellulose acetate, vinylite and polystyrene can be colored simply by dipping into a hot dye solution. The materials needed are inexpensive and the process takes only a few minutes.

Several water-soluble plastic dyes are being marketed for this purpose. These are offered in a wide choice of colors—sky blue, royal blue, turquoise, yellow, orange, scarlet, magenta, purple, green, amber, brown, red, ruby, violet and black. Some common aniline dyes also may be diluted with water for use in the same way, and you may find it interesting to experiment with a few of these.

Immersion dyes are sold in concentrated liquid form. This is diluted with 10 parts of water and then heated until the solution is just barely at the simmering stage, or about 190 to 200° F. The plastic to be dyed should first be carefully washed with alcohol to remove any oils or grease. How long you should submerge it in the dye will depend on the depth of tone you want, but usually won't exceed 60 seconds. Immediately after removal, rinse the plastic in cold water. Colors imparted to plastics in this way will not wash off.

Two or three dyes of the primary colors will enable you to produce many of the other colors. Simply dip the plastic into separate baths of the primary colors.

PSM photos by W. W. MORRIS

Copyrighted material

Sold as a concentrated liquid, this plastic dye is first diluted with 10 parts of water. Here the container is a heat-resistant glass beaker, but for flat work the dye may be placed in a shallow metal receptacle like a pie pan.

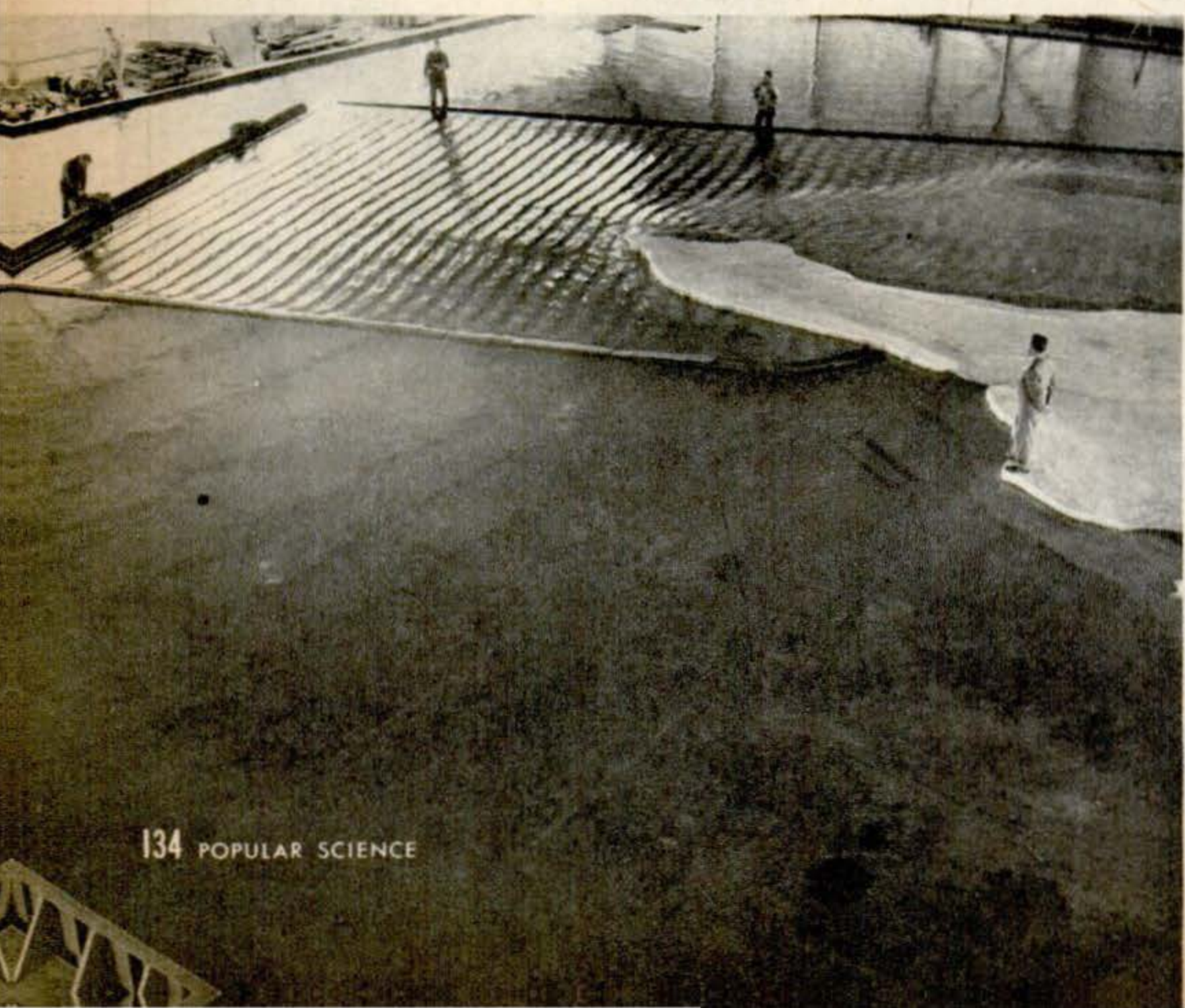
Before dyeing a piece of plastic, grasp it with a pair of tongs and carefully swab all surfaces with alcohol to remove any dirt and grease that may impair the action of the dye. Do not touch the plastic thereafter with your bare fingers.

Heat the bath to just simmering (200° F.), and dip the plastic for a period up to 60 seconds, depending on the depth of tone that is desired. If bent plastic is left in too long or the dye becomes too hot, the piece may straighten.

Remove the dyed plastic from the bath and rinse it immediately in cold water. Plastic dyed in this way is color-fast and may be heated and shaped after dyeing if you prefer. The dye will wash easily from the container.

Copyrighted material

Hurricanes Harnessed in



ABOVE: Seven miles of Guam coastline and Apra harbor are compressed within this 120-foot-square model built for the Navy's Bureau of Yards and Docks. The cliff on which the man is standing is actually 220 feet high on the Pacific isle.

The wave machines, with their 20-foot-long air chamber (upper left-hand corner), produce tiny wavelets that represent ocean waves from 7½ to 22½ feet high. Sidebars prevent the waves from spreading.

Copyrighted material

MINIATURE storms, raging in an airplane hangar among the orange groves at Azusa, Calif., are sending waves no taller than a thumbtack beating against a model of Guam's Apra harbor. By studying the behavior and effects of these baby breakers, scientists are building a defense against typhoon damage to the Navy's proposed new permanent base on this important outpost in the Pacific.

Built of steel and concrete to a scale of one to 300, the model of Guam's harbor is 120 feet square and partially surrounded by water. Special pneumatic machines designed by Dr. Robert T. Knapp, California Institute of Technology engineer, produce miniature waves from one-quarter to three-quarters of an inch in height.

The motor-driven, valve-controlled machines alternately supply pressure and vacuum to a 20-foot-long air chamber, kicking and sucking the water under the chamber to produce the wave effect. A differential generator regulates the height and frequency of the waves.

Fluctuation of the waves is recorded continuously at 17 different points in the water surrounding the model by thin spring-steel wires, alternately coated with three layers of silver and two of gold. Variations in the electrical resistance of these wires, as the water rises and recedes, are translated by a galvanometer-type oscillograph into a

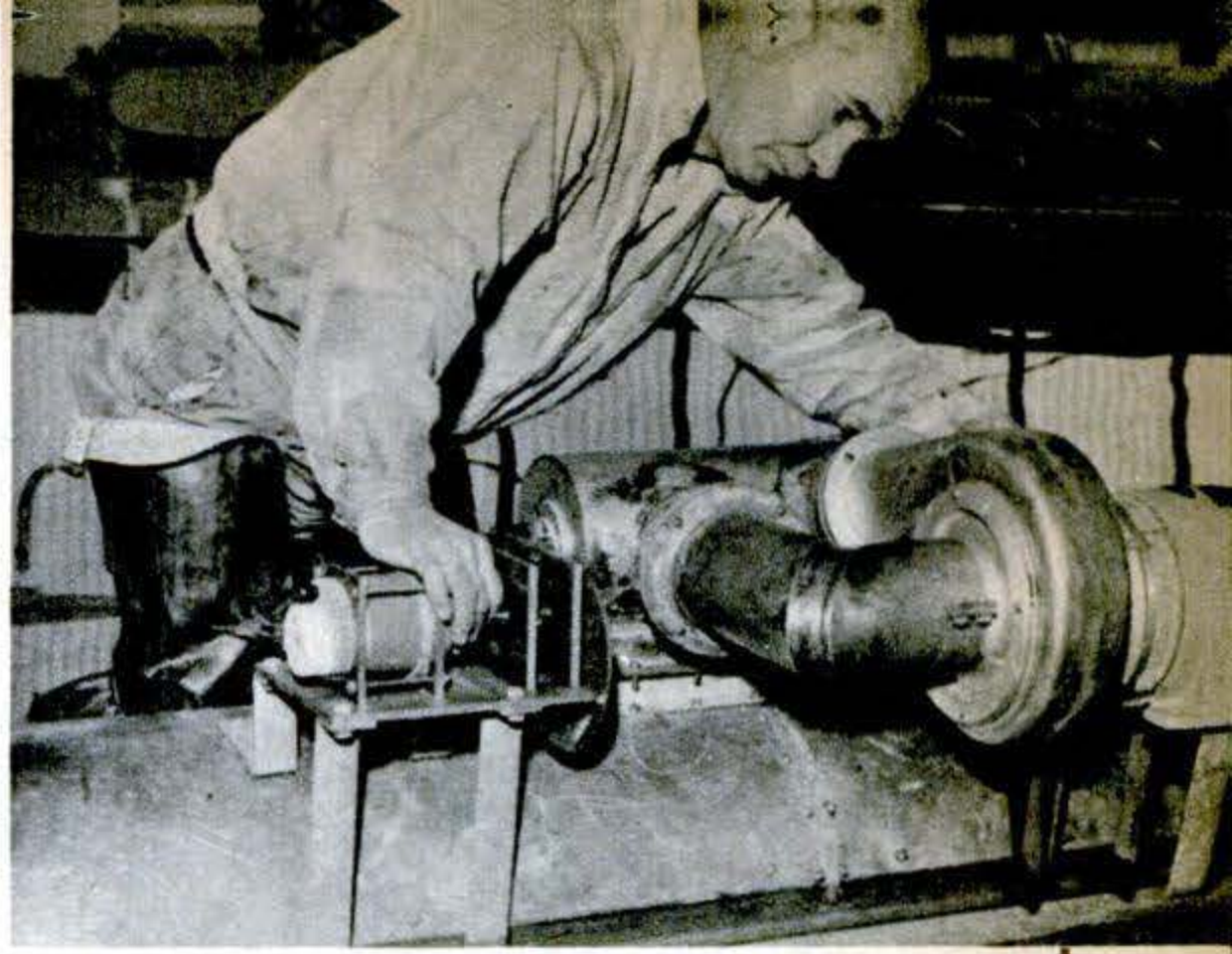
a Hangar

moving photograph of 17 wavy lines duplicating the water's movement.

To make certain that the studies cover the latest facts about the harbor site, measurements of wave heights and directions, current velocities, and other conditions of wind and water at Guam are collected regularly by the Navy.

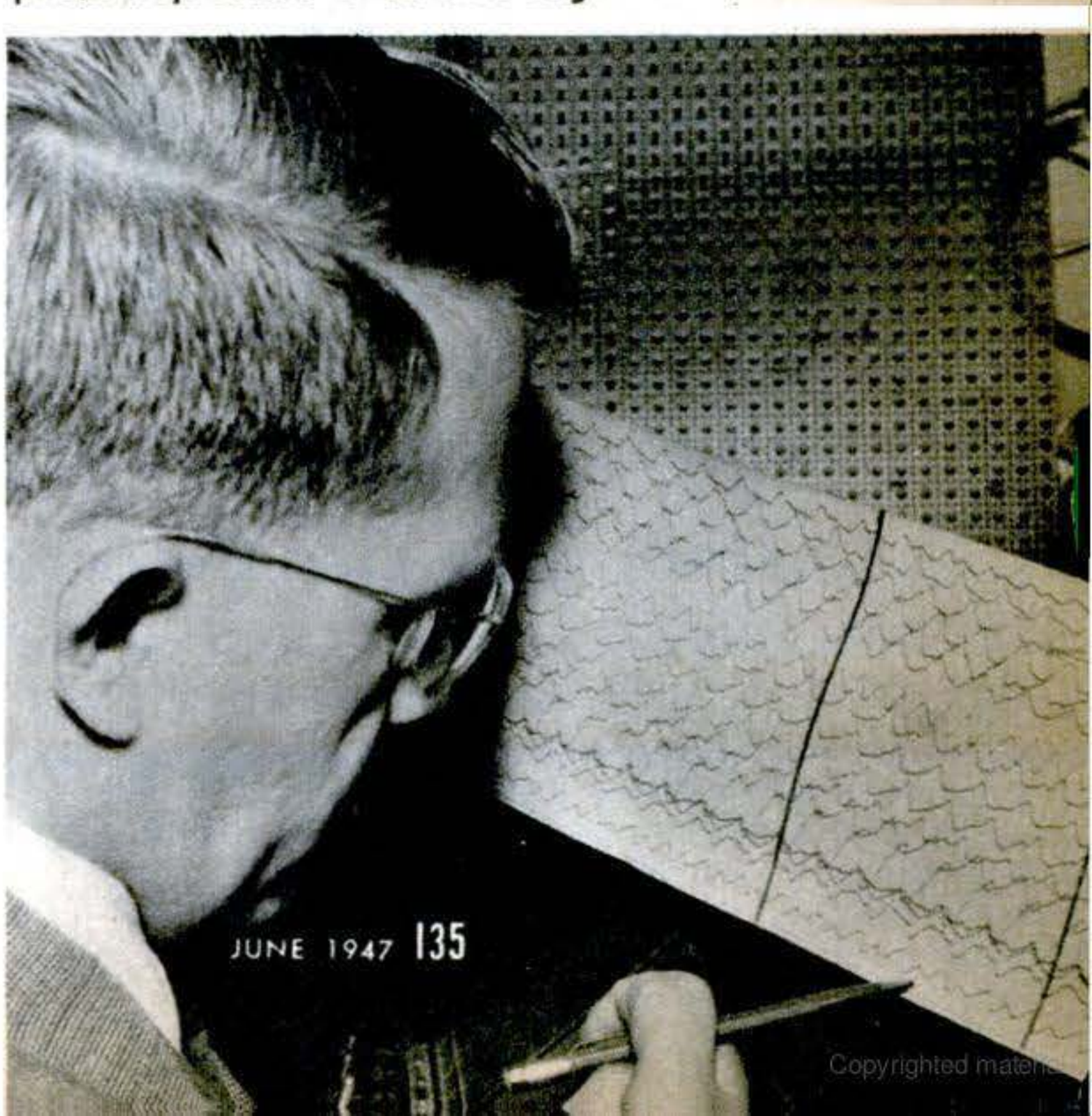
From these studies will come data for the placement of slips, docks and drydocks, the position of the breakwater's outer limit, and the solution of the harbor's cleansing problem, including changes in the Agat drainage channel and the Pite boat channel.

The $275,000 model will save millions, the Navy hopes, in the actual Guam project, expected to cost $1,000,000,000.



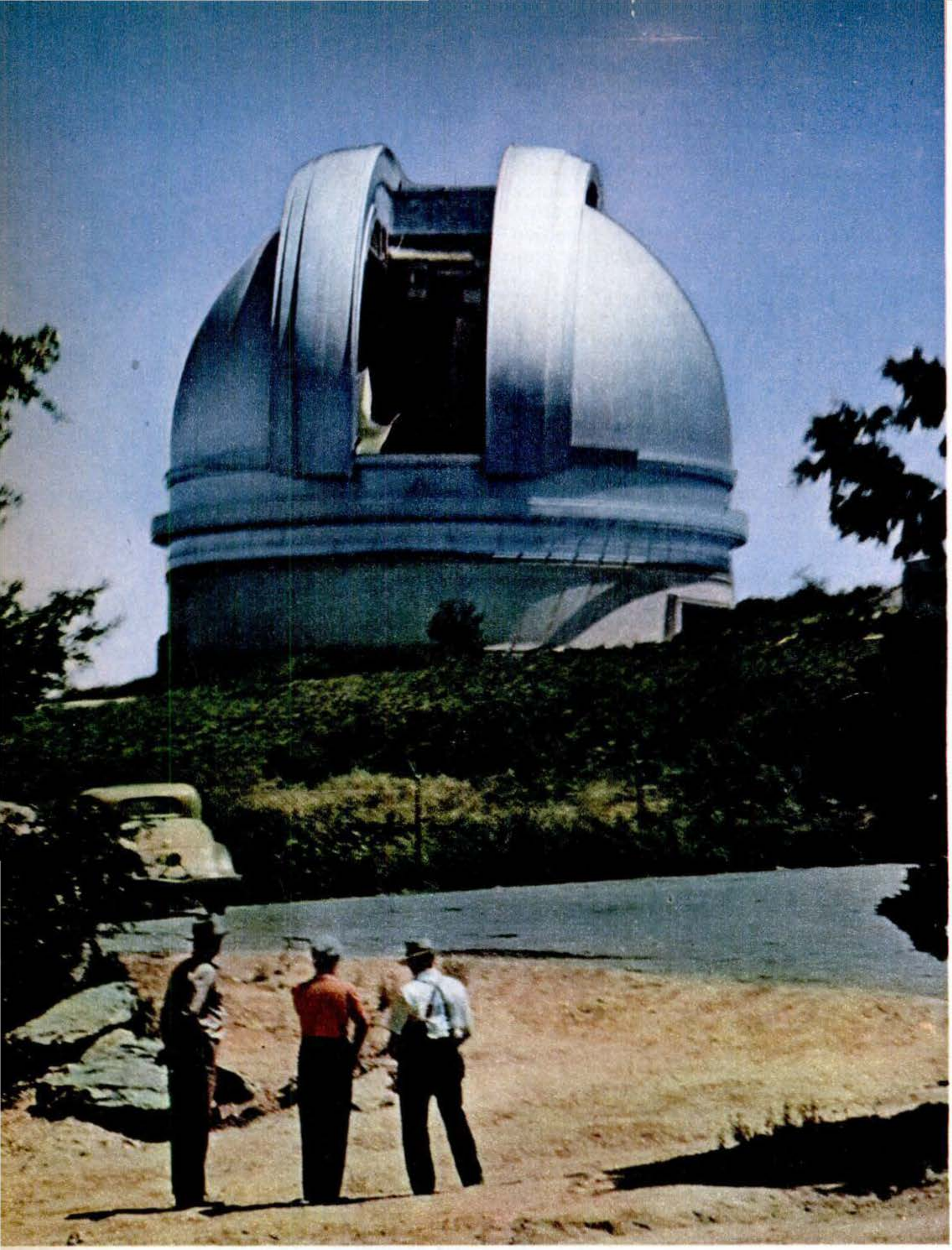
The pneumatic machine, above, operates the compression and vacuum chamber, which forces water in and out of the bottom through narrow ports to produce the required waves.

Movements of the miniature waves are measured simultaneously at 17 points by resistance elements like the one above. Tiny boat in the center of the photo represents a 60-foot tug.



Wavy lines record the motion of the water on a continuous chart. Space between the heavy lines represents three seconds; taller fluctuations, 30-foot waves, occurring at Guam every 15 years.

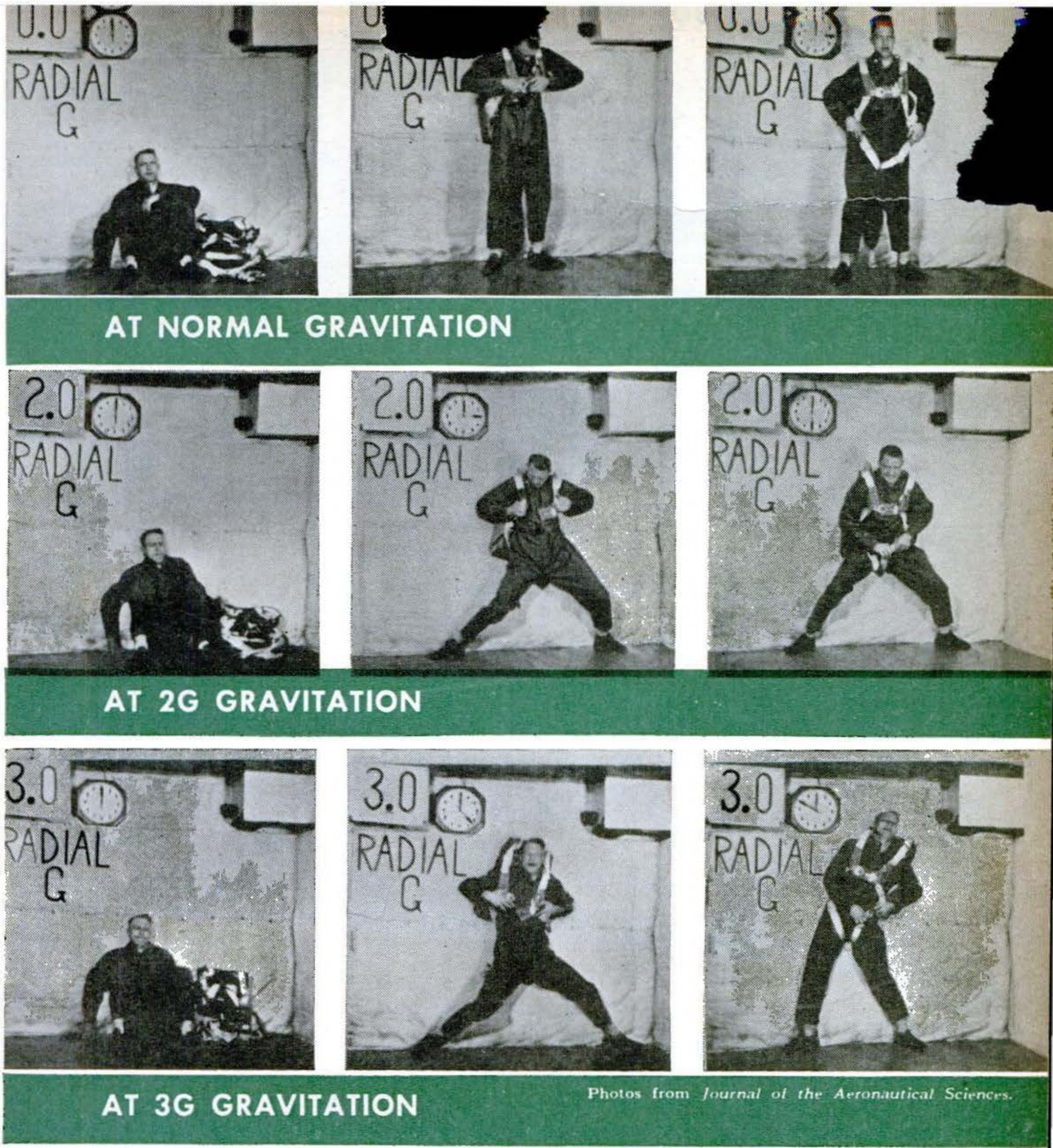
Copyrighted mater



Gateway to the Universe

THROUGH this huge dome, sometime early next year, the giant telescope built by the California Institute of Technology will focus its 200-inch eye for the first time on stars as far away as a billion light years. Twenty years of planning and construction have gone into the $6,000,000 project atop Mount Palomar. Its telescope is expected to allow astronomers to peer four times farther into space than ever before.

Copyrighted material



Photos from *Journal of the Aeronautical Sciences.*

Tests in centrifuge show pilot easily donning his 'chute in 15 seconds at normal gravitation. At 2 G the job takes 30 seconds; at 3 G, it is a 50-second struggle. Under 4-G stress it would be impossible.

Superspeed Needs Supermen

MAN'S brain has devised planes that can fly faster than the speed of sound, but he has not yet been able to condition his body to take the physical tortures and impact of supersonic flight. And since we are too impatient to wait for evolution to develop sturdier bodies, the solution lies in neutralizing or minimizing the effects of flight at 1,000 and more miles an hour.

Much of the basic research has already

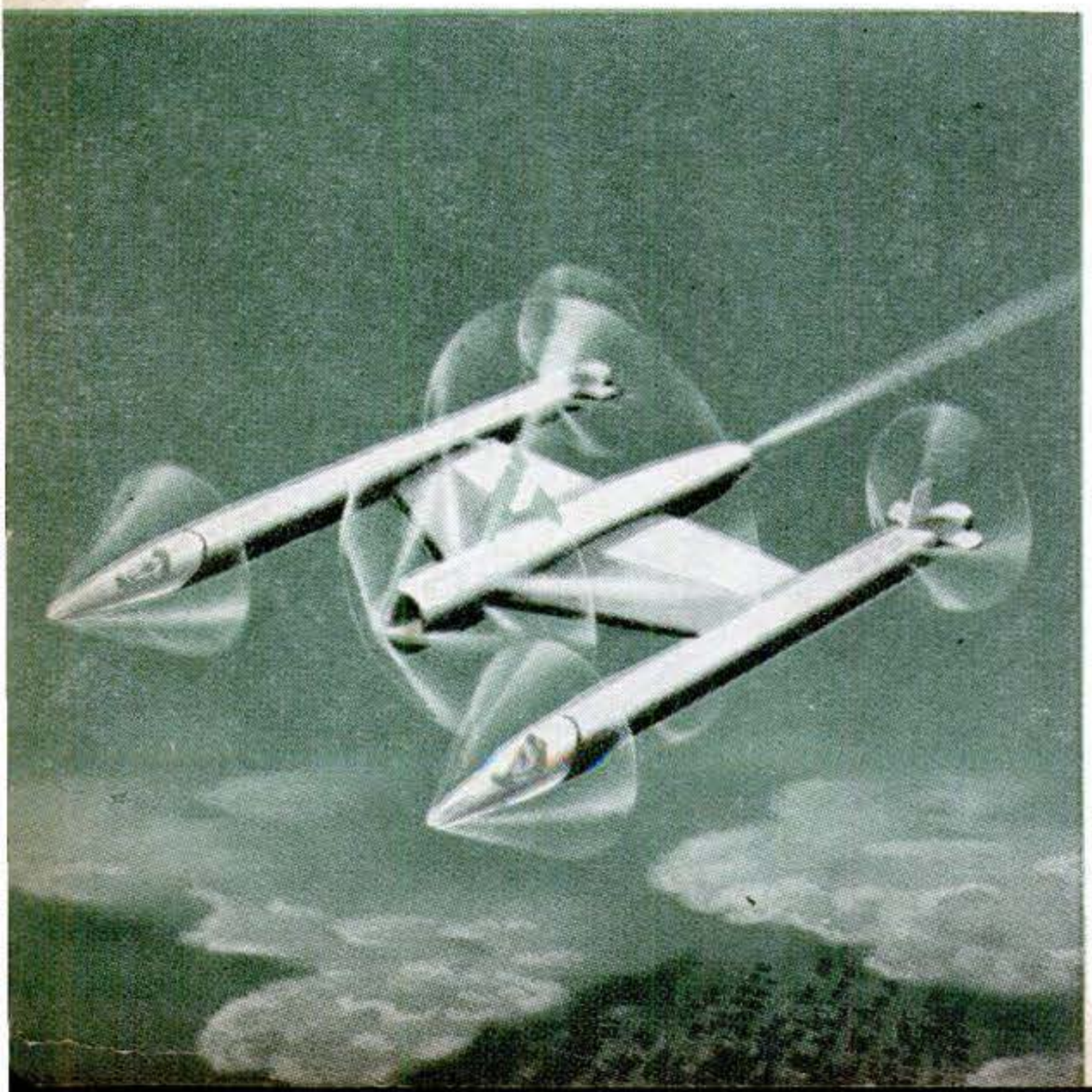
Copyrighted material

Artist's conception of a supersonic airplane with large center ram-jet. Pilots sit in front of twin fuselages, which are equipped with rocket engines to supply auxiliary power if the ram-jet engine fails.

been done (PSM, Oct. '46, p. 121), but we still have a long way to go before pilots can open wide the throttles of the supersonic planes already here, like the Bell XS-1 and the Douglas Skystreak. The Navy, the AAF and civilian researchers are all working at top speed to prepare the man for the machine.

The cockpit for the supersonic pilot will be pressurized and refrigerated against the terrific heat created by friction. It will also be soundproofed, not only to eliminate the roar of rockets and ram-jets, but to protect the flier against ultrasonic vibrations and noises above the range of hearing to which his brain centers and glands will be exposed.

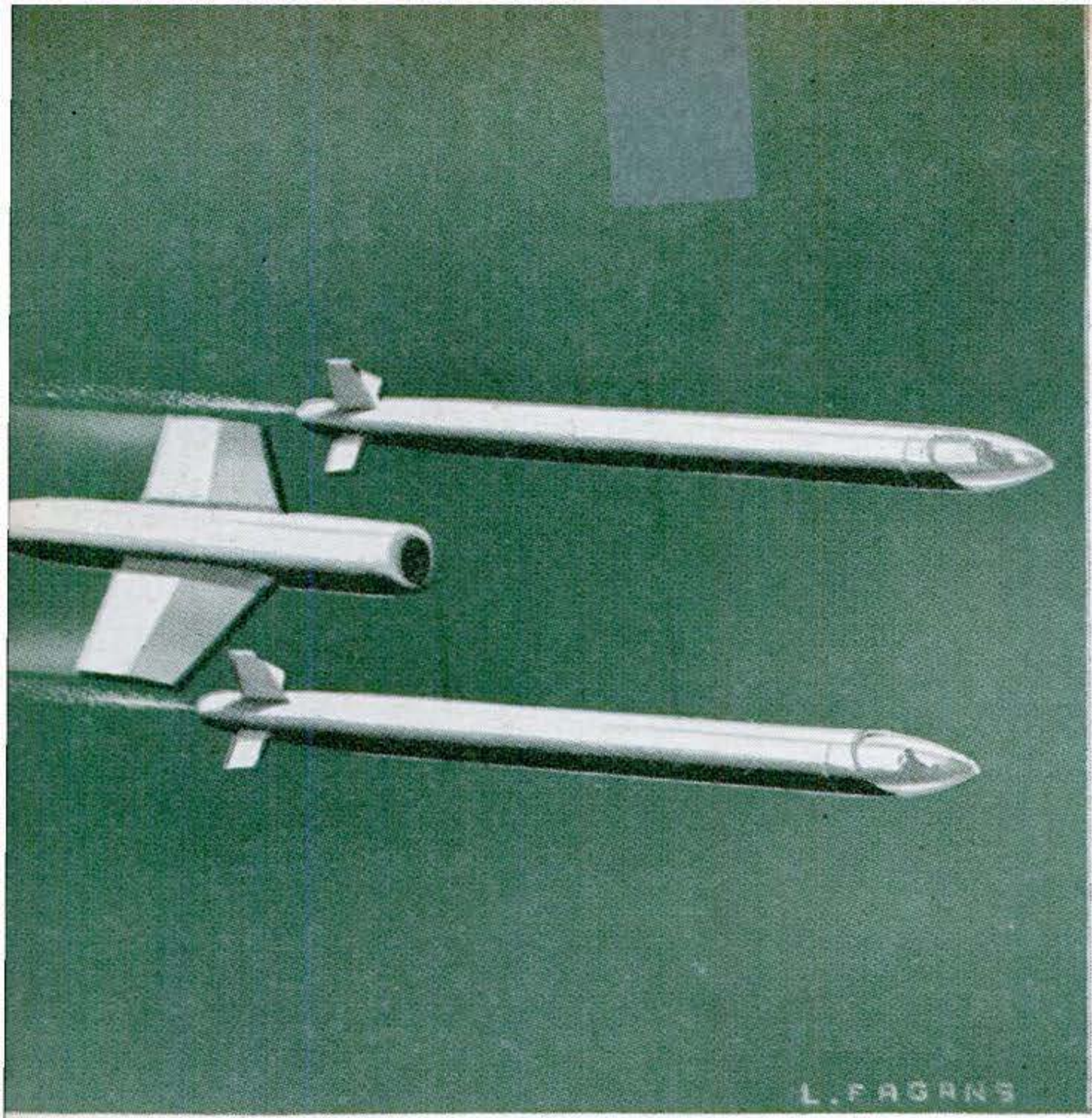
"Mach cones," opaque shock waves at supersonic speed, may require instrument flying even in clear weather. Special optical devices may also be needed.

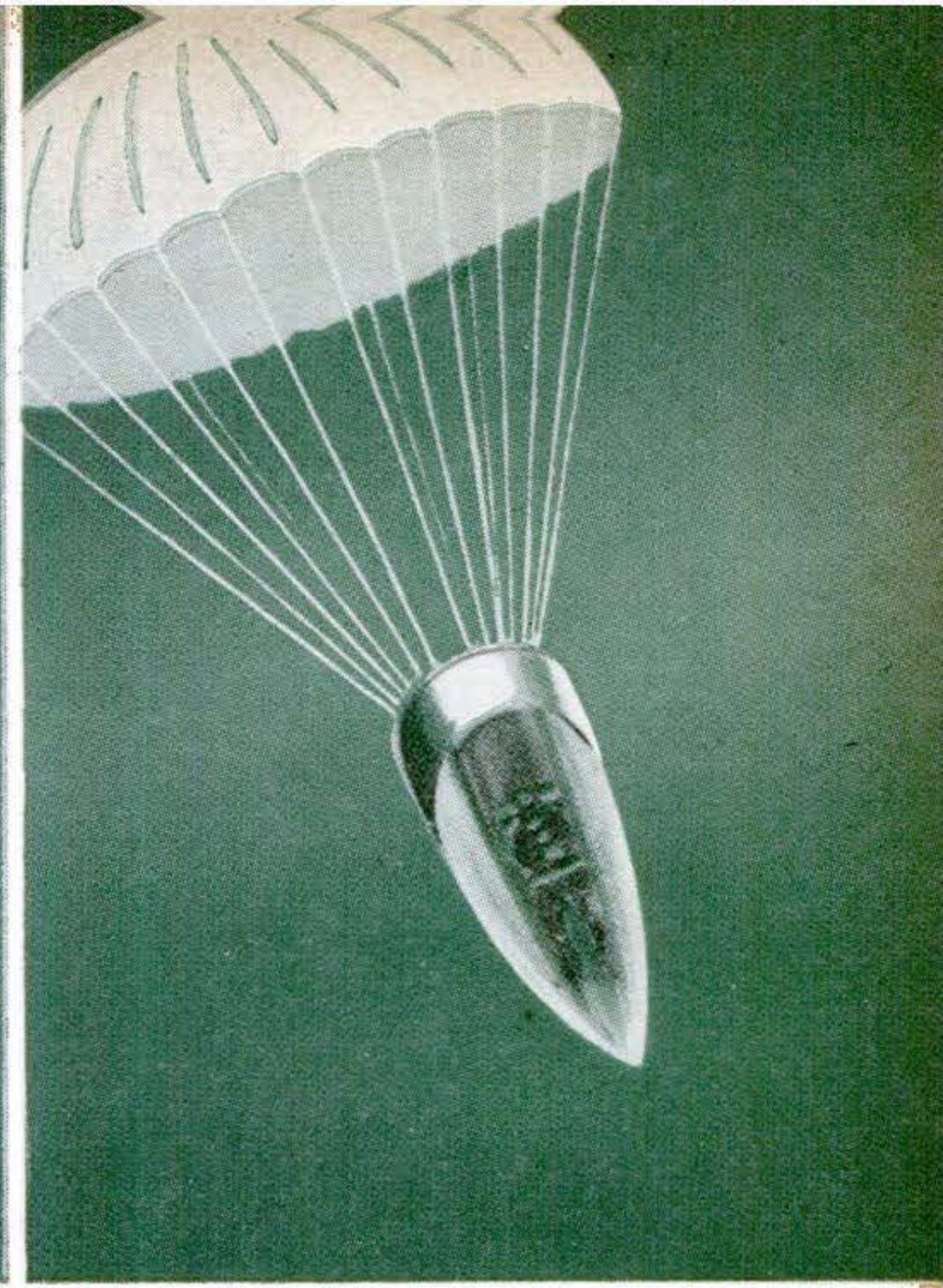


Another problem is the matter of G (unit of measure of pull in any direction; the normal weight of an object or person is one G). Should the power plant of a plane flying at 1,500 miles an hour fail or lose speed, the deceleration to a coasting speed of 500 miles an hour, at the most, would be terrific. With the sturdiest seat and safety harness to hold the pilot's body firm, he would literally explode as everything inside him kept going when the plane and body stopped. One test pilot has predicted that the deceleration of a supersonic plane might involve forces as high as 100 G.

The photographs on page 137 clearly show what this would mean. These pictures, part of a report by Charles Code, Earl Wood, and Edward Lambert of the Mayo Clinic, vividly indicate what happens to a man at only 3G. They explain why a supersonic pilot must have some auxiliary power plant to continue motion if the main source of power should fail or suddenly slow down

Copyrighted material





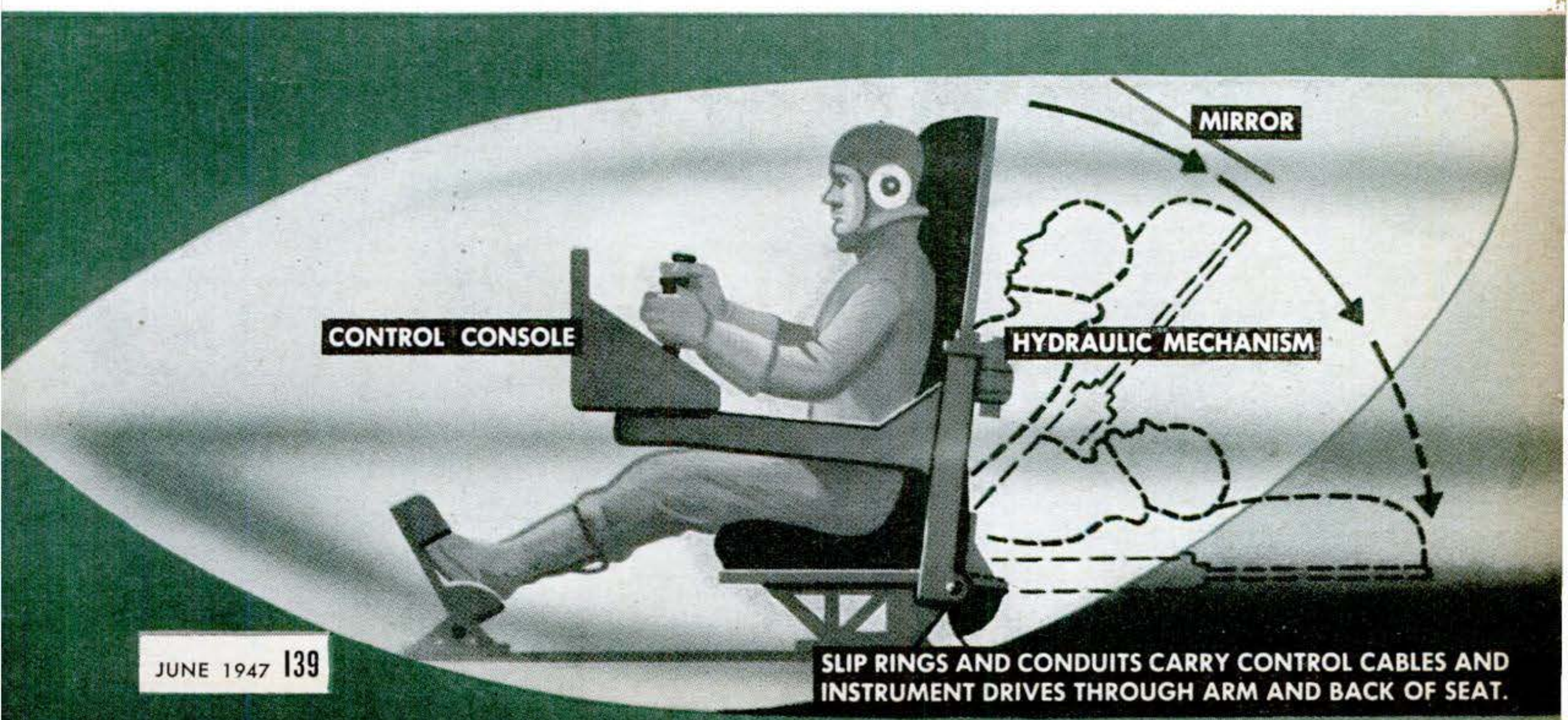
If the plane's speed falls below safe limit, jet and wing section is jettisoned and rocket engines cut in. When the fuselages slow to safe speed, pilots pull levers to release capsule noses, then open their 'chutes.

for any reason, enabling him to decelerate at a slower rate until he reaches a speed at which it is safe to parachute.

In addition to speed and sharpness of maneuvers, bodily position is also related to the effect of G forces. Experiments have shown that by lying prone, a pilot can take twice as many radial G (in turns and pull-outs) without blacking out. The force is directed through the shortest, strongest part of the body instead of traveling the airman's whole length. In the Northrop XP-79 flying wing and in an experimental Navy plane the pilot flies prone.

The prone position, however, is not healthy when lateral G is exerted by suddenly speeding up or slowing down. To solve this problem, the Navy has devised an automatic reclining seat. The flier sits upright during straight flight and lies supine during turns and dives. Thus, the position of the body is automatically changed so that

Automatic reclining seat protects pilots from effects of high G forces by changing position of the body.



PICTURE HORIZON

RADAR SCOPE

CONTROL STICK

GYROCOMPASS

TELEVISOR

FLIGHT CONTROL TELLTALE

THROTTLE

ELECTRONIC PLATTER

RECESSED SWITCHES

Simplified instrument panel enables pilot to make instant adjustments needed for supersonic flight.

	KNOTS	TACHOMETER	BURNER RING FUEL PRESSURE	JET TEMPERATURE	FUEL PERCENTAGE	OIL PRESSURE	CABIN PRESSURE
TAKE-OFF	—	—	—	—	—	—	—
CLIMB	—	—	—	—	—	—	—
CRUISE	—	—	—	—	—	—	—
MAXIMUM	—	—	—	—	—	—	—
LET-DOWN	—	—	—	—	—	—	—
LAND	—	—	—	—	—	—	—

FUNCTION TABS

Variations in lines on the telltale panel warn pilot of any faulty operation; function tabs correct it.

the G travels through the strongest portion of the body regardless of maneuvers.

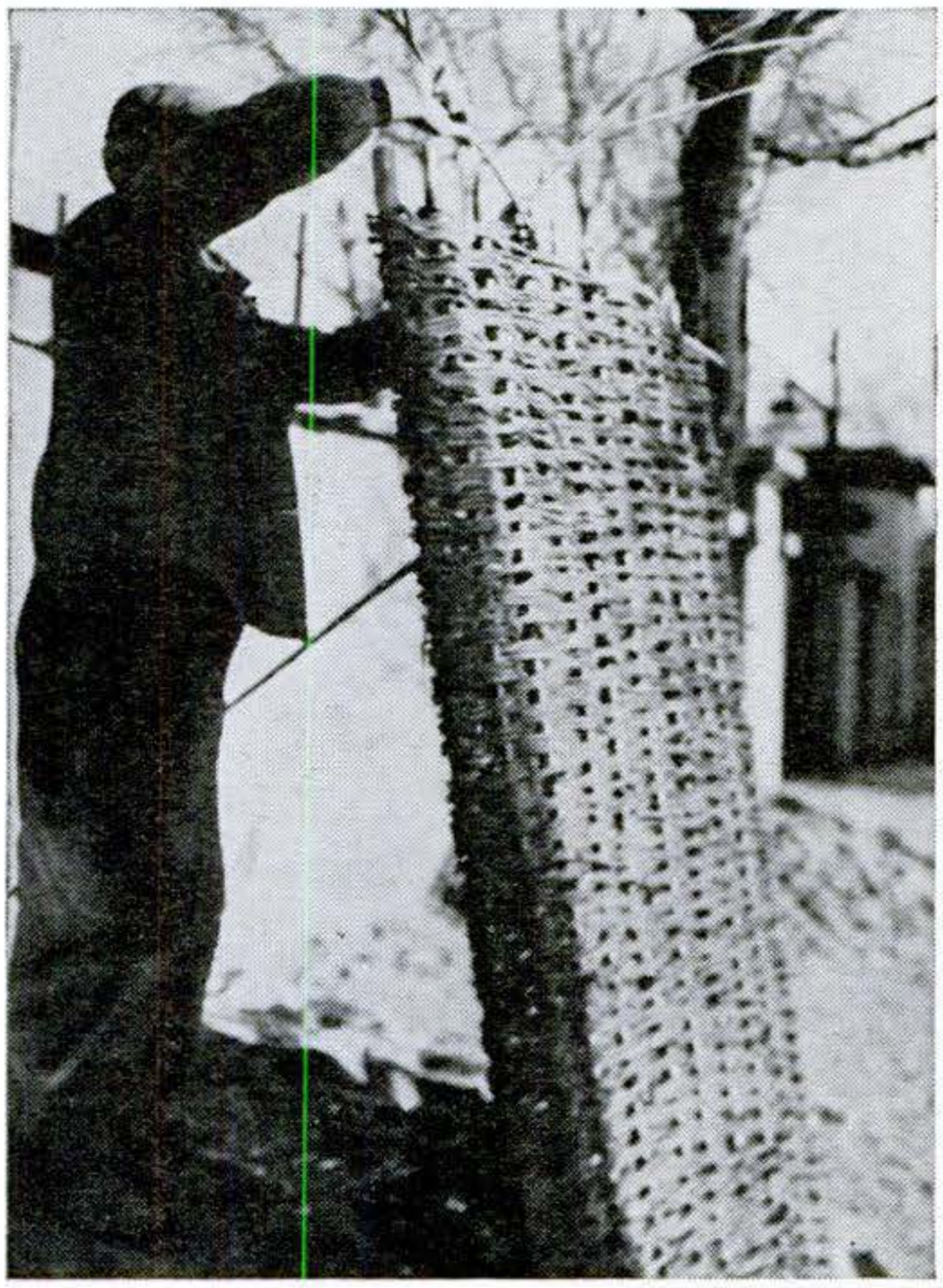
Besides protection against the brutal shocks and pressures of supersonic flight, the pilot will need something to help him match the speed of his own reactions with the speed at which he travels. Instead of the maze of dials, levers and switches in a conventional aircraft, his control panel will have a half-dozen basic instruments to tell him at a glance how his plane is behaving. Equally simple controls will govern its performance.

As the Wright brothers flew before we had a practical knowledge of aerodynamics, so supersonic flight may become a reality before we have all the answers. But for both humanitarian and scientific reasons, we want the pioneer supersonic pilot to return to earth alive. If he is to do that, there are a lot more answers that must be supplied before the take-off.—JAMES PECK.

Copyrighted material

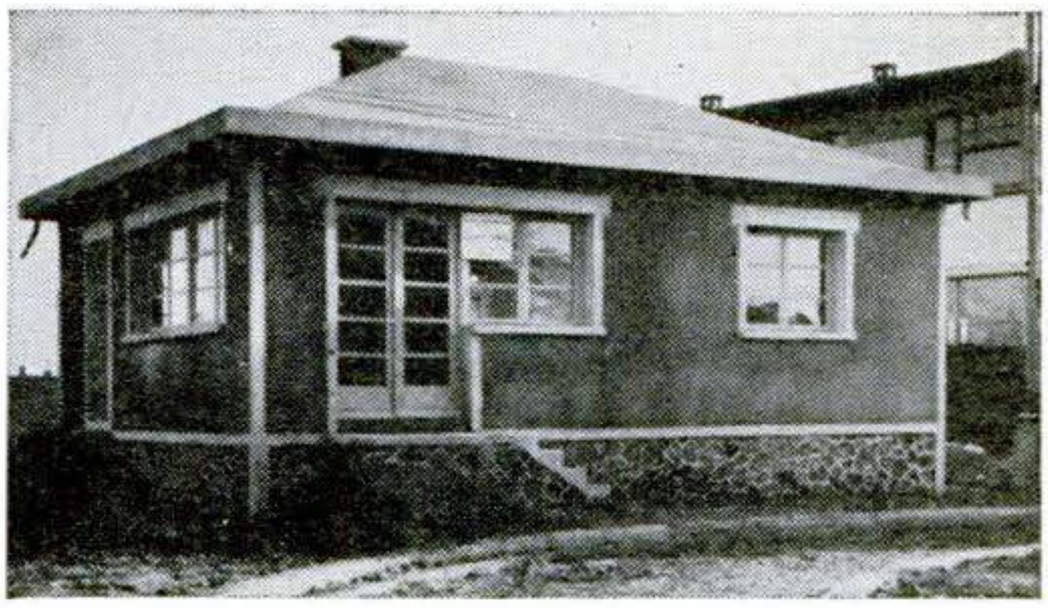
French Weave Houses

SCARCITY of ordinary materials to meet the French housing shortage has led to the modernization of one of the oldest building methods—wattle and daub. Woven wickerwork panels, fitted into walls and plastered over, are said to be as durable as reinforced concrete. Whole wickerwork villages are reported planned for devastated areas.



Willow branches are woven in and out between sticks to make extremely light basketwork panels.

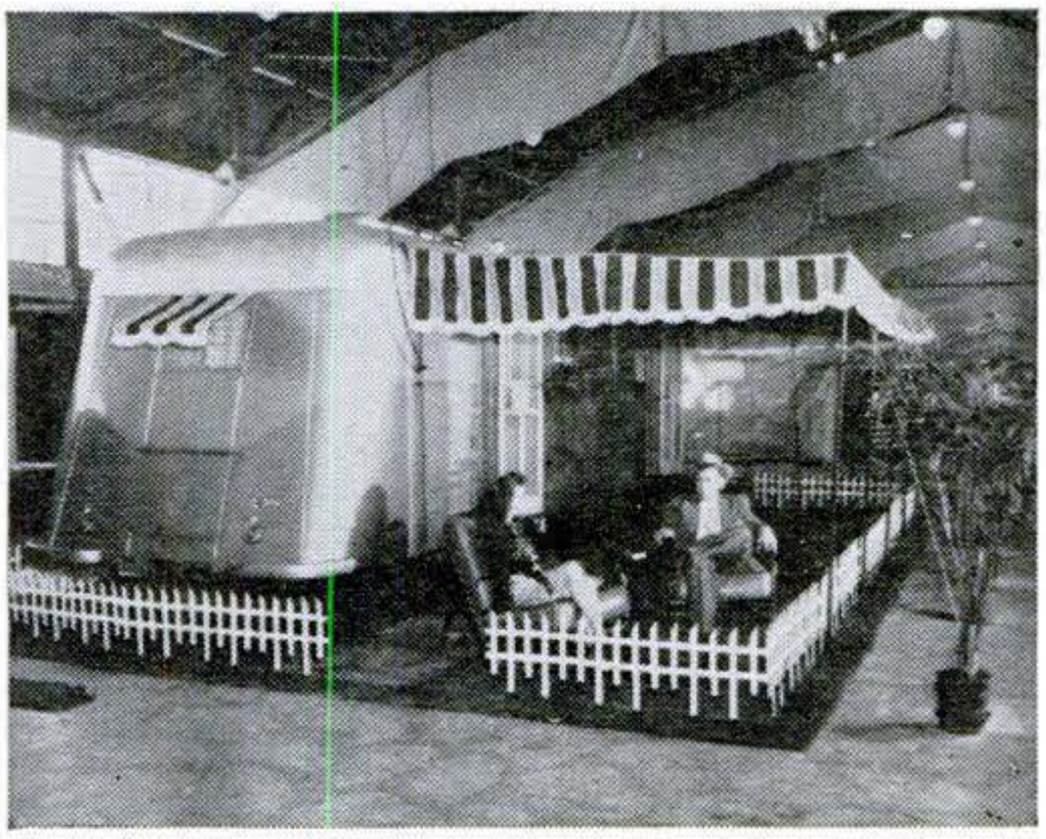
The panels are fitted into place in the walls of a partly built house. One man can carry a panel.



In a finished house, the wickerwork panels are plastered over to make a weather-resistant wall.

Trends in Trailers

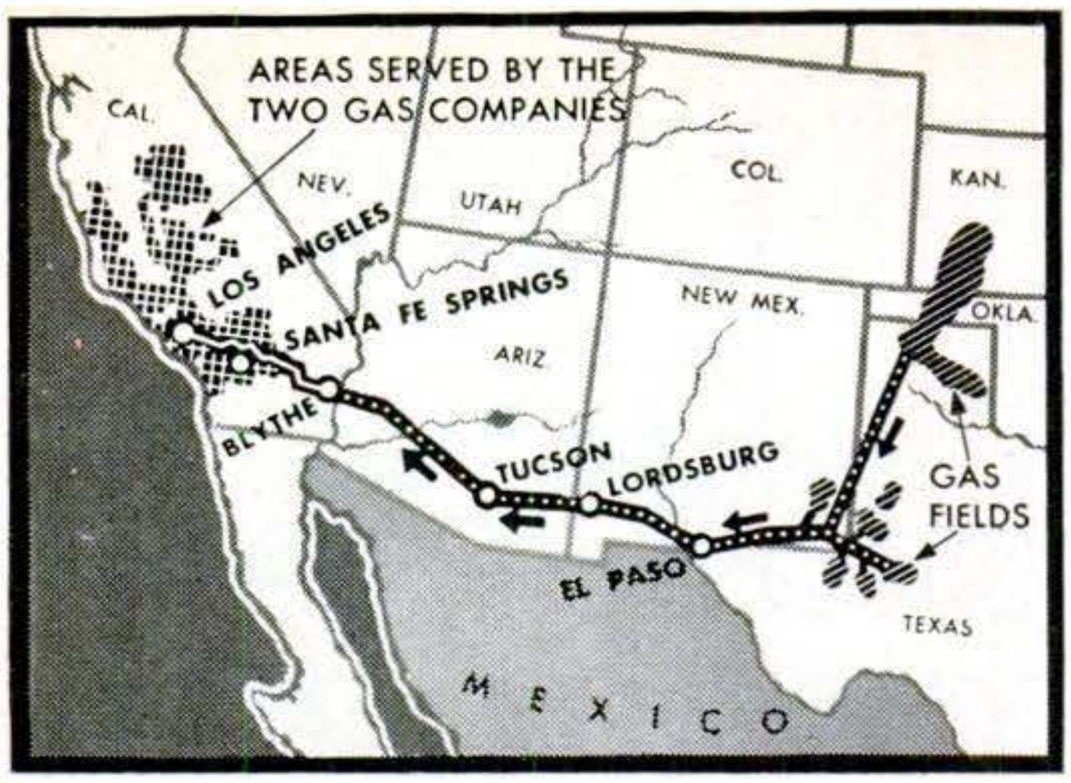
OUR own housing shortage has redoubled interest in trailers. The National Trailer Coach Exhibit in Chicago brought out a variety of 1947 models. Shown below are a 27-foot type equipped with an awning, and a double-decker—the upper section raised by a hydraulic lift—said to be used in Hollywood as a portable dressing room.



This trailer, designed to carry six passengers, is made by the Zimmer Boat and Trailer Company.

The double-decker, built of wood and metal by the Liberty Trailer Coach Company, holds eight persons.

Copyrighted material

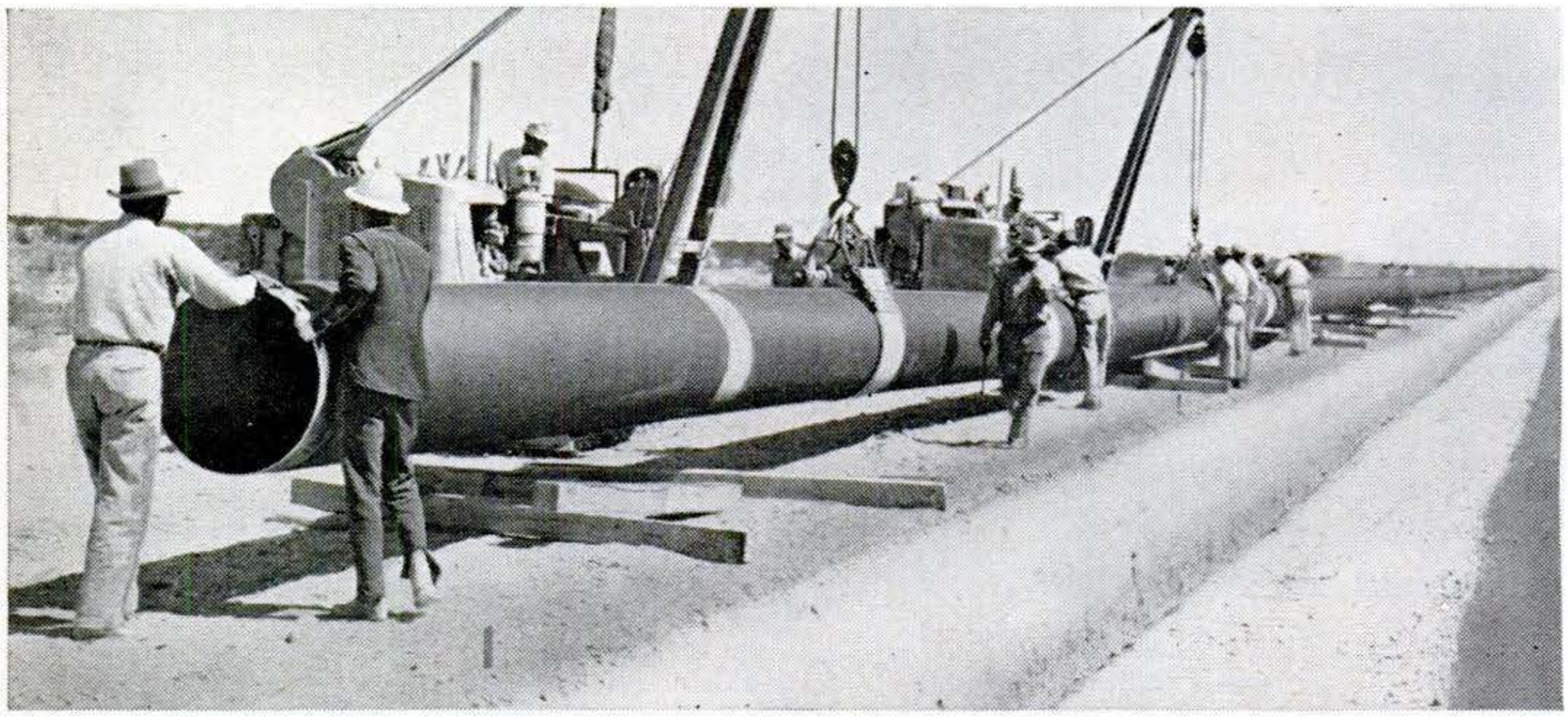


Three gas companies are co-operating in building the new pipe line. Two of them will act as distributing concerns in the area shown on the map.

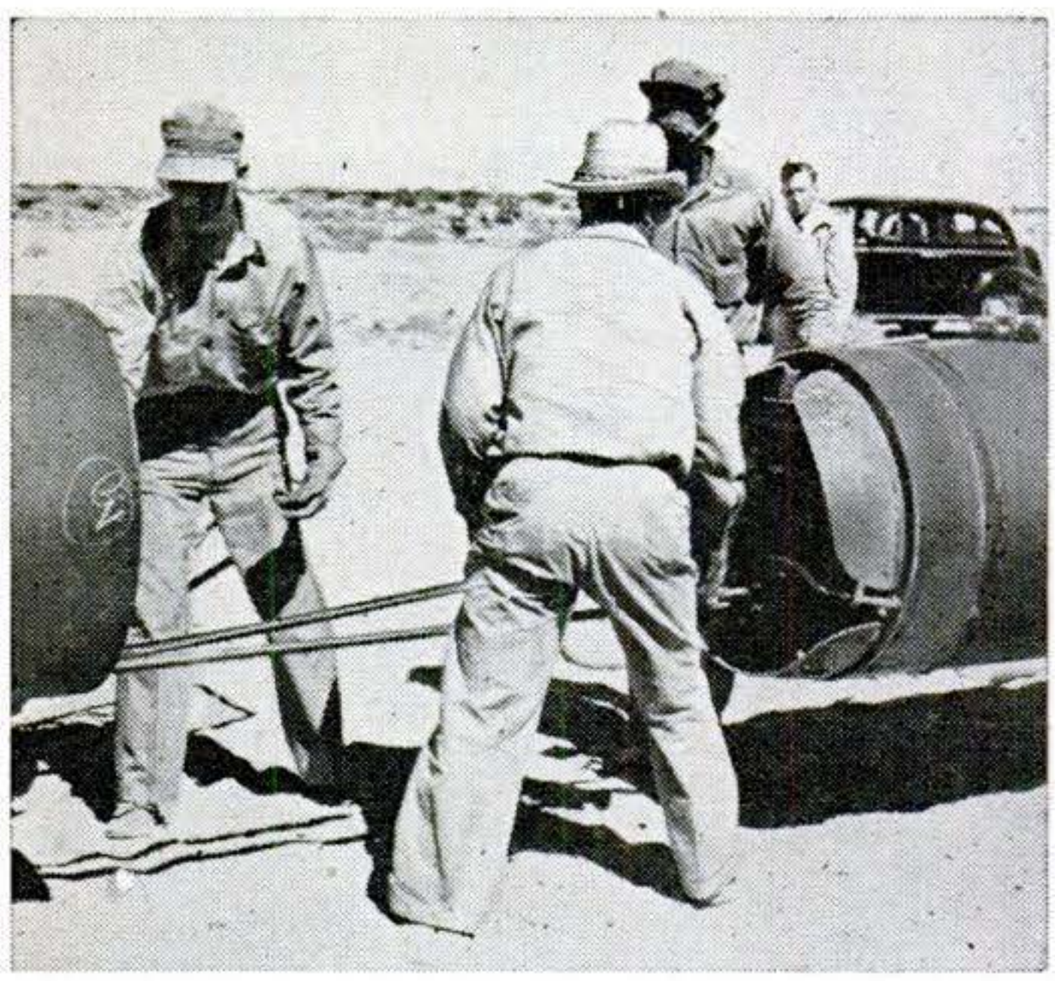
"Biggest Inch"

THE "biggest inch" of all is going west—from Texas 1,212 miles to the Pacific. Slung on cables high above seven rivers, diving 12 feet deep to avoid flash floods, climbing mountains and crossing deserts, the $70,000,000 pipe line is growing five miles a day. By next winter it will be pouring 305,000,000 cubic feet of gas a day into a California pinched between swelling de-

Photos from Southern California Gas Co.



Side-boom tractor moves pipe section into place for welding; beyond, pipe is ready for lowering into trench. Here, near Blythe, diameter is 30 inches: farther east it is 26, then drops to 24, the size of the East's "Big Inch." Larger size provides extra storage equal to five big tanks.



Two sections are pulled together by interior-expansion clamp that grips them for welding. Clamp is then collapsed and moved to next joint.

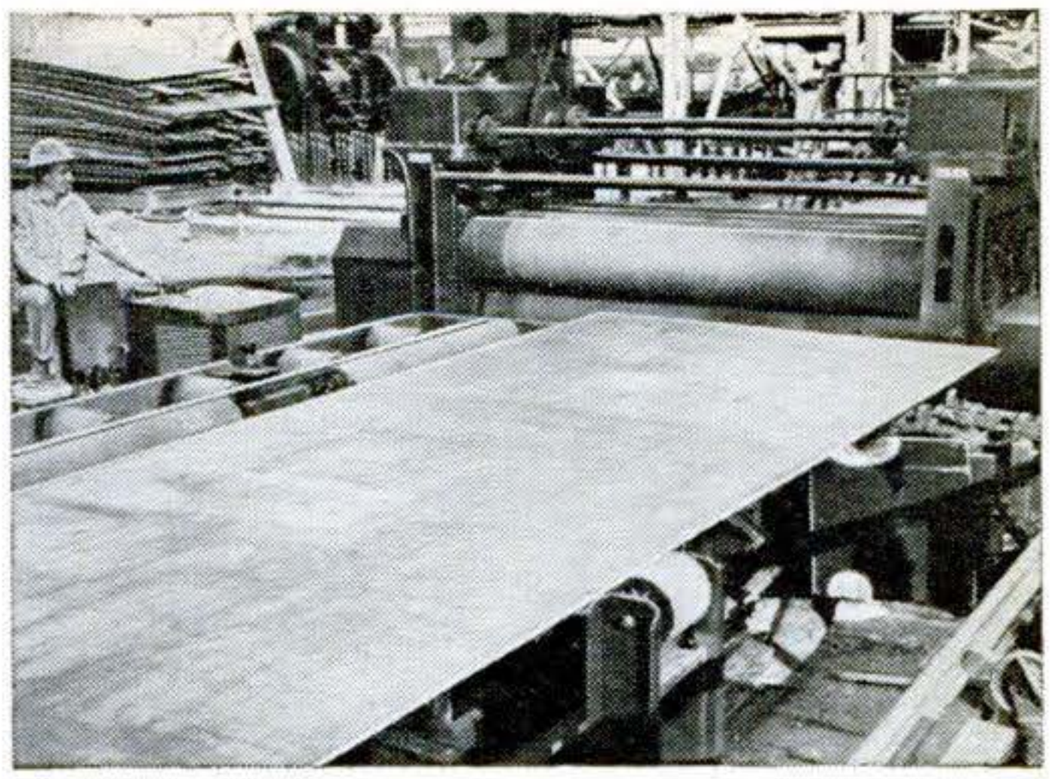
"Stovepipe" welding joins sections, three weld passes being made around each joint for a faultless bond. X-ray checks are made at intervals.

Copyrighted material

Goes West

mand and slowly diminishing gas reserves.

The pipe starts at the big Hugoton-Panhandle basin and the Permian basin to the south. Hugoton alone is estimated to hold enough gas to feed the line 140 years. Processed to remove hydrogen sulfide, gas will be dehydrated to prevent pipe corrosion. Pressure, maintained by compressors, will reach 810 p.s.i. in final section.



Big mangle irons out waves in special manganese steel plates for 30-inch pipe. Each sheet is about 92 inches wide, 30 feet long, only 9/32 inch thick.

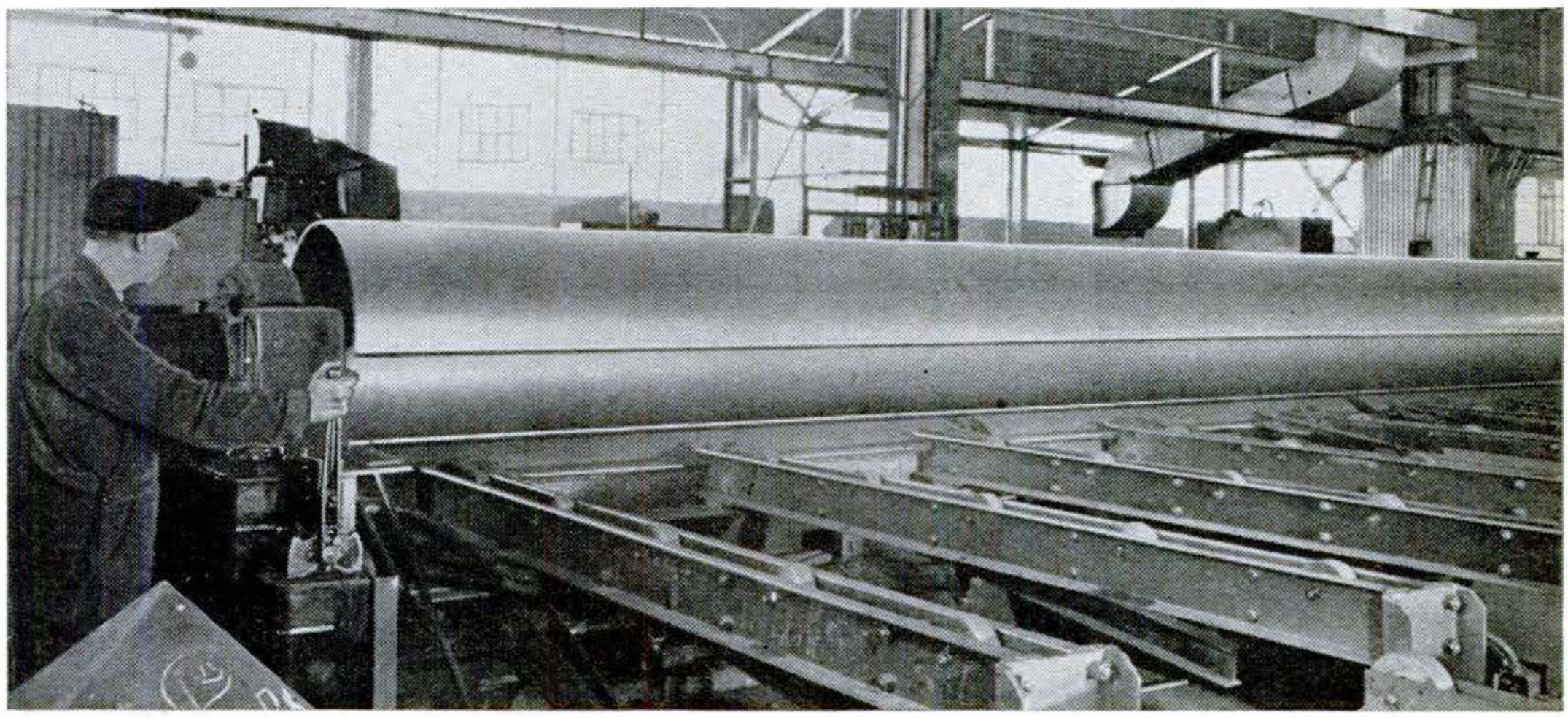
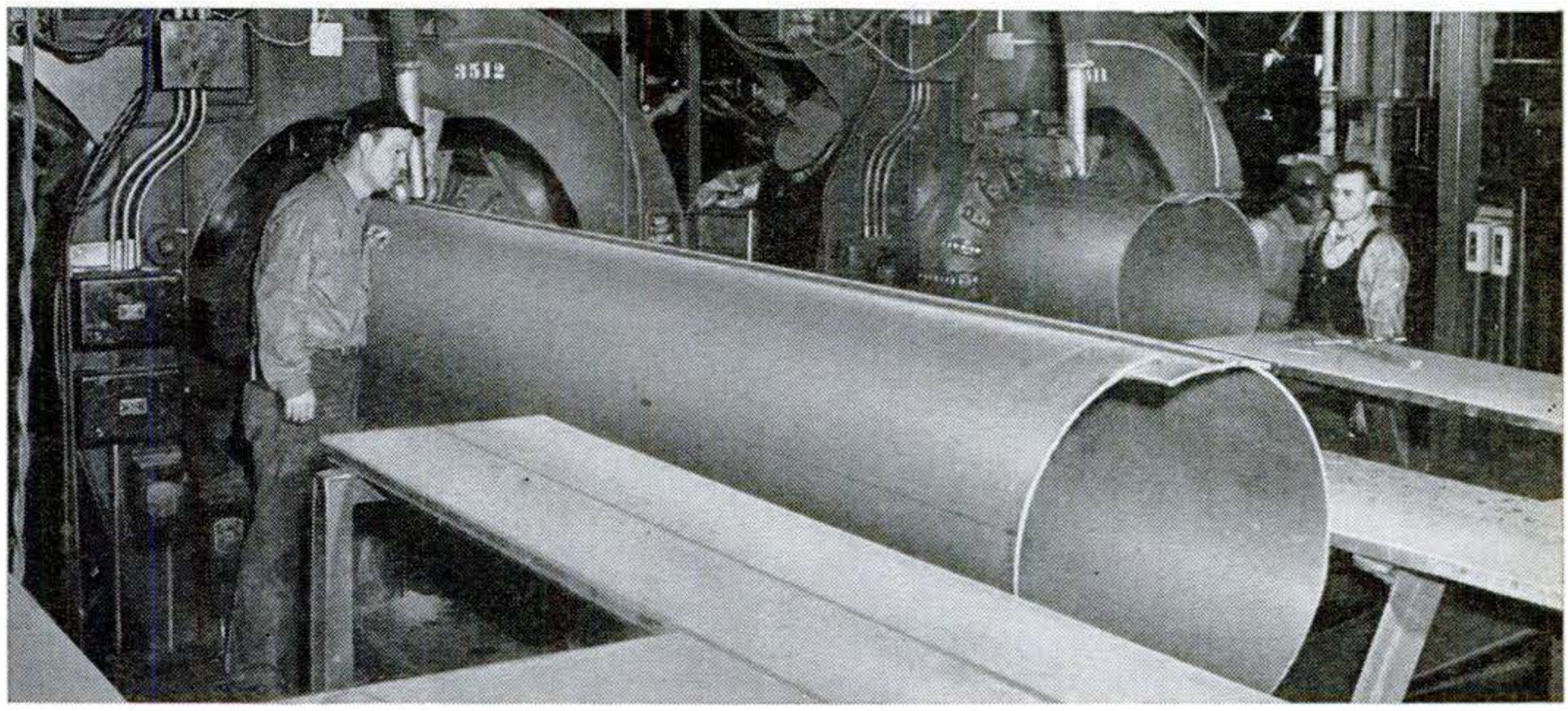
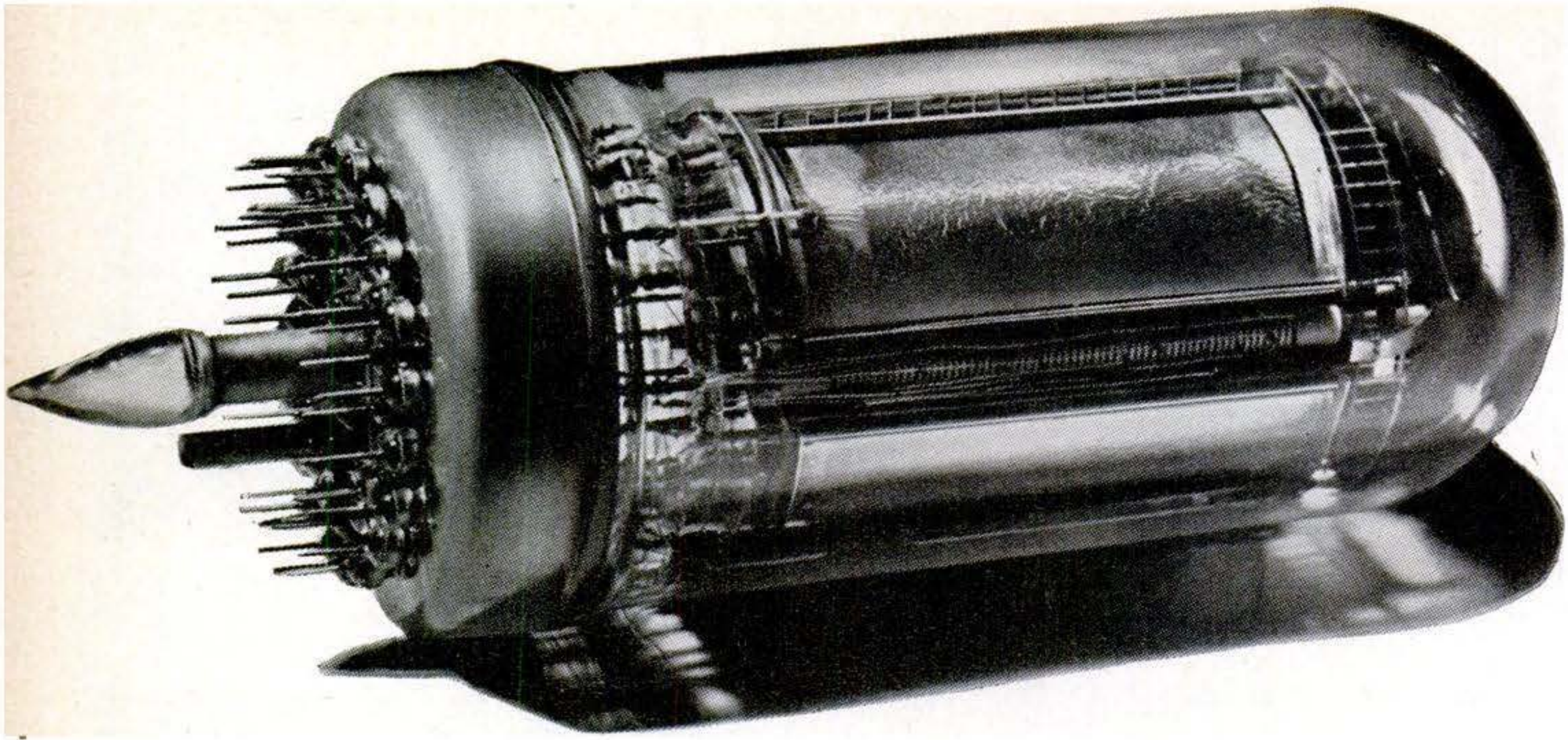


Plate is rolled like a cigarette. Revolving steel cylinders grip and pull it through, bend it into cylinder and bring edges together for the seam. Thanks to pressure control in the line, pipes can be extra thin, saving 7,400 tons of steel. Section now moves to automatic submerged-arc welder.



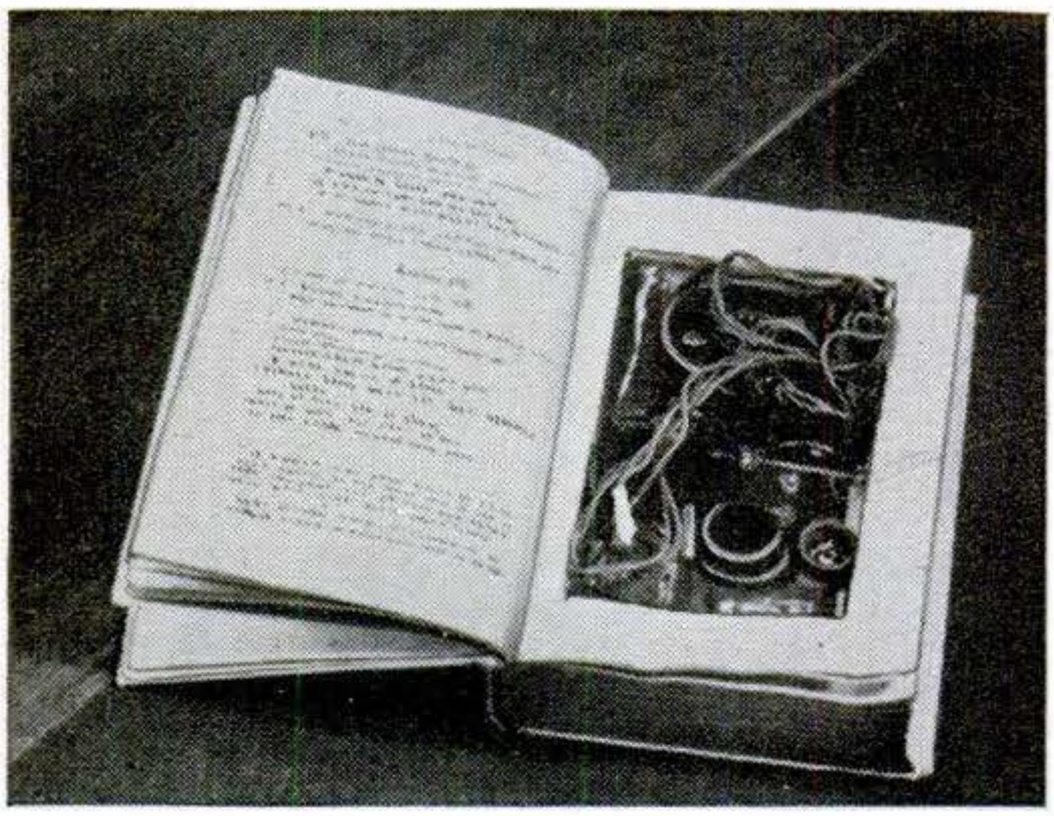
Seam is welded by high-voltage current, carried to pipe through a granular melt laid down along the seam just ahead of the electrode, which is immersed in it. All welding action takes place underneath the melt. The resulting weld penetrates the metal and is stronger than the parent plate.

Copyrighted material



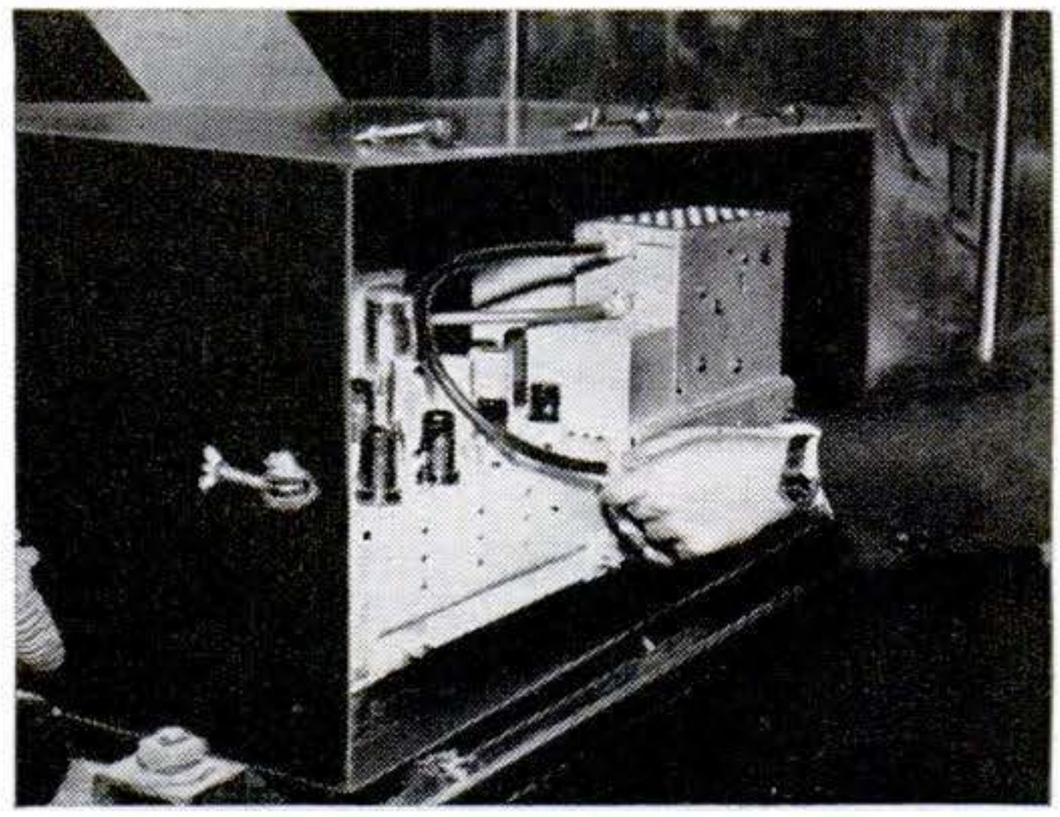
Tube with a Memory

DEVELOPED to help electronic computers "remember" the factors involved in long mathematical sequences, RCA's Selectron is expected to permit the multiplication of two 13-digit numbers in about one hundred-millionth of a second. A screen of tiny wires forms a checkerboard of windows through which electrons can pass to store electrostatic impulses, representing up to 4,096 mathematical factors, on a target insulator. The tube's circuit "opens" the windows individually to receive impulses and to release them again whenever they are required for the calculation.



How Dutch Hid Radios

WHEN the Nazis confiscated Dutch radios in 1943 to restrict foreign broadcasts, pocket-size receivers by the thousand were secretly turned out for the resistance movement by workers of the Philips Research Laboratory, Eindhoven, Holland. The one shown in the cutout portion of a book is typical of their design. Using only one or two midget tubes, they were hidden in lamps, powder dusters and other everyday objects. One, inside a can of vegetables, was even sent safely into a Nazi prison camp.



FM Aids Railroads

THIS mobile FM transmitter-receiver, part of equipment recently tested on the Southern Pacific Railroad, provides a stormproof party line for train crews and dispatchers (PSM, April '45, p. 130). In the tests, engineers in the cabs of long freight trains checked their orders with conductors riding in the cabooses, with stations along the line and with San Francisco headquarters via telephone relay. Use of the experimental equipment was reported to have saved time and trouble in handling trains.

Copyrighted material

6-in-1 Wind Tunnel

NACA's compact, inexpensive, versatile research "package" is ready for U. S. colleges.

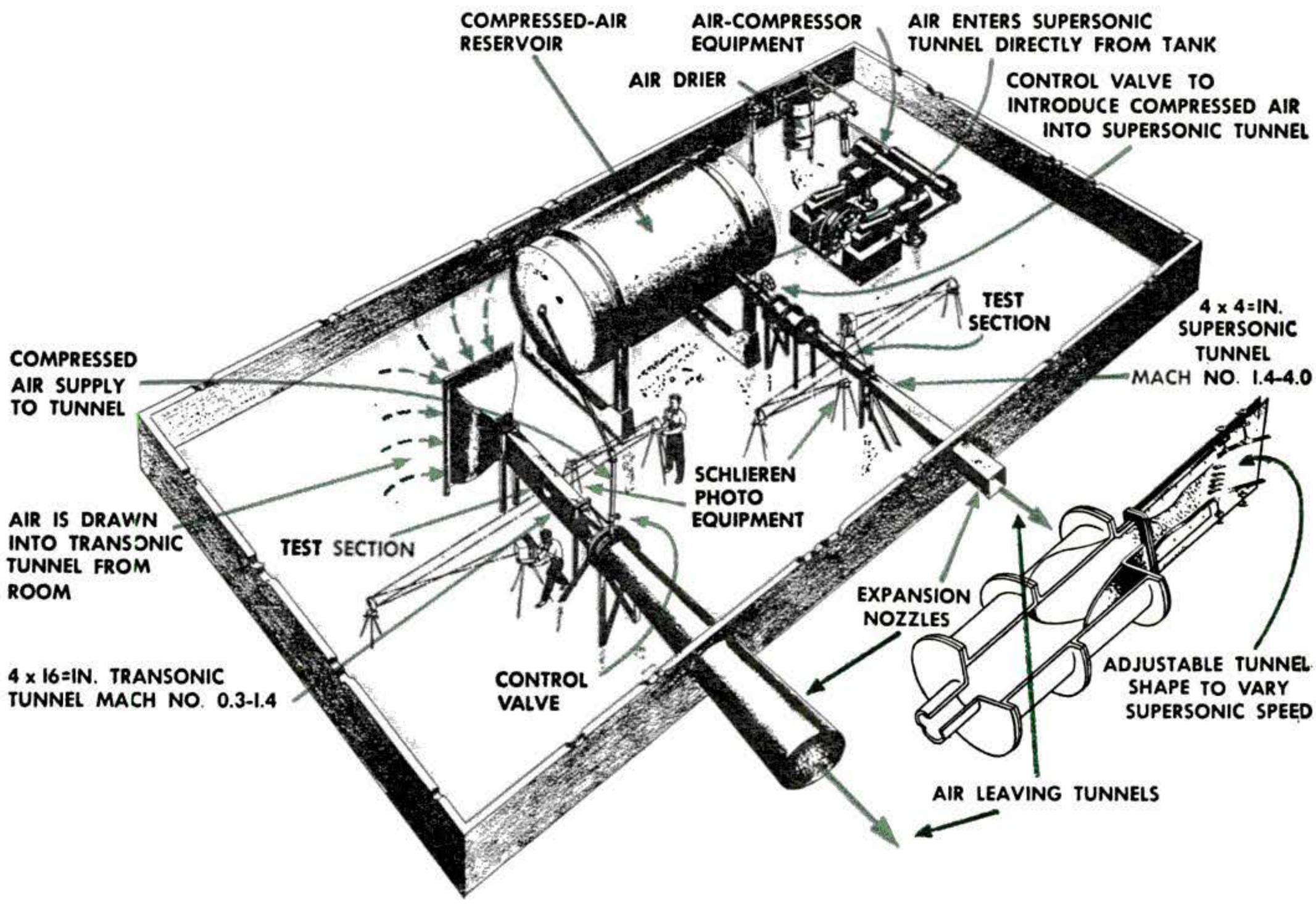
A POOR man's wind tunnel, a 20th of the usual price, is now available to American colleges. Designed by the National Advisory Committee for Aeronautics, it comes as a "package," takes up a third the space of a baseball infield, and can be used for at least six major types of aviation research.

The Navy is making the new tunnel, called the Compressible Flow Unit, available to colleges on a share-the-cost basis. The entire installation, which can be comfortably housed in a one-story building 40 by 65 feet, costs only $50,000 to $75,000—or even less if surplus war materials are used. Present wind tunnels cover at least one acre, cost about $1,000,000, and are expensive to operate.

Unlike the old "continuous" tunnels, which run under steady pressure, the packaged tunnel is the "blow-down" type. Air is compressed in a tank, then released to provide the stream. The air flow lasts only a few minutes before the tank must be refilled, but in this time it can achieve a speed as high as any tunnel has reached—Mach No. 4, or more than 3,000 m.p.h.

The Navy expects the units to be used for studies of airfoils, combustion problems in ram-jets, and tests of nozzle shape effectiveness (useful for tail-pipe design). Other potential research subjects include the internal-flow problems found in jet units, the comparative value of various combinations of wing and fuselage shapes, and the heat-transfer problems resulting from friction on the outer skin of aircraft.

The tunnels promise the training of more students in aerodynamics to replenish the reservoir of young scientists emptied by wartime Selective Service (PSM, Mar. '46, p. 88). The first of the units is being tested at the NACA laboratory at Langley Field, Va., where it will be a showcase sample for prospective customers.



The Compressible Flow Unit has two small tunnels: a transonic tunnel with a 14- by 16-inch test section and a supersonic tunnel four inches square. Compressed-air system, with reservoir and dryer, powers both.

Copyrighted material

This Is Where Your Money Goes

Small change is big business in vending machines that mix drinks, pop corn, insure your life—and keep out slugs.

Minit-Pop, like many of the new vending machines, automatically performs several separate functions to prepare and dispense a fresh quantity of merchandise each time a coin is inserted.

By Herbert Johansen

PSM photos by W. W. Morris

THE vending machines that now mix drinks, pop corn and sell you anything from hot coffee to insurance policies represent an investment of more than a thousand 10-ton trucks full of nickels. The maws of the coin-operated machines dispensing chewing gum, nuts, beverages and candy took in almost half a billion dollars last year. No one knows how many millions went through the mechanisms of their coin-in-the-slot brothers, but some retailers estimate that, by 1957, about three billion dollars worth of merchandise will be sold this way annually.

These figures do not take into consideration the astronomical take of other types of coin machines—pinball games, "one-armed bandits" and juke boxes. Such entertainment and gambling machines are a field apart; the National Automatic Merchandising Association will not accept as a member a manufacturer, distributor or operator who handles even one slot machine.

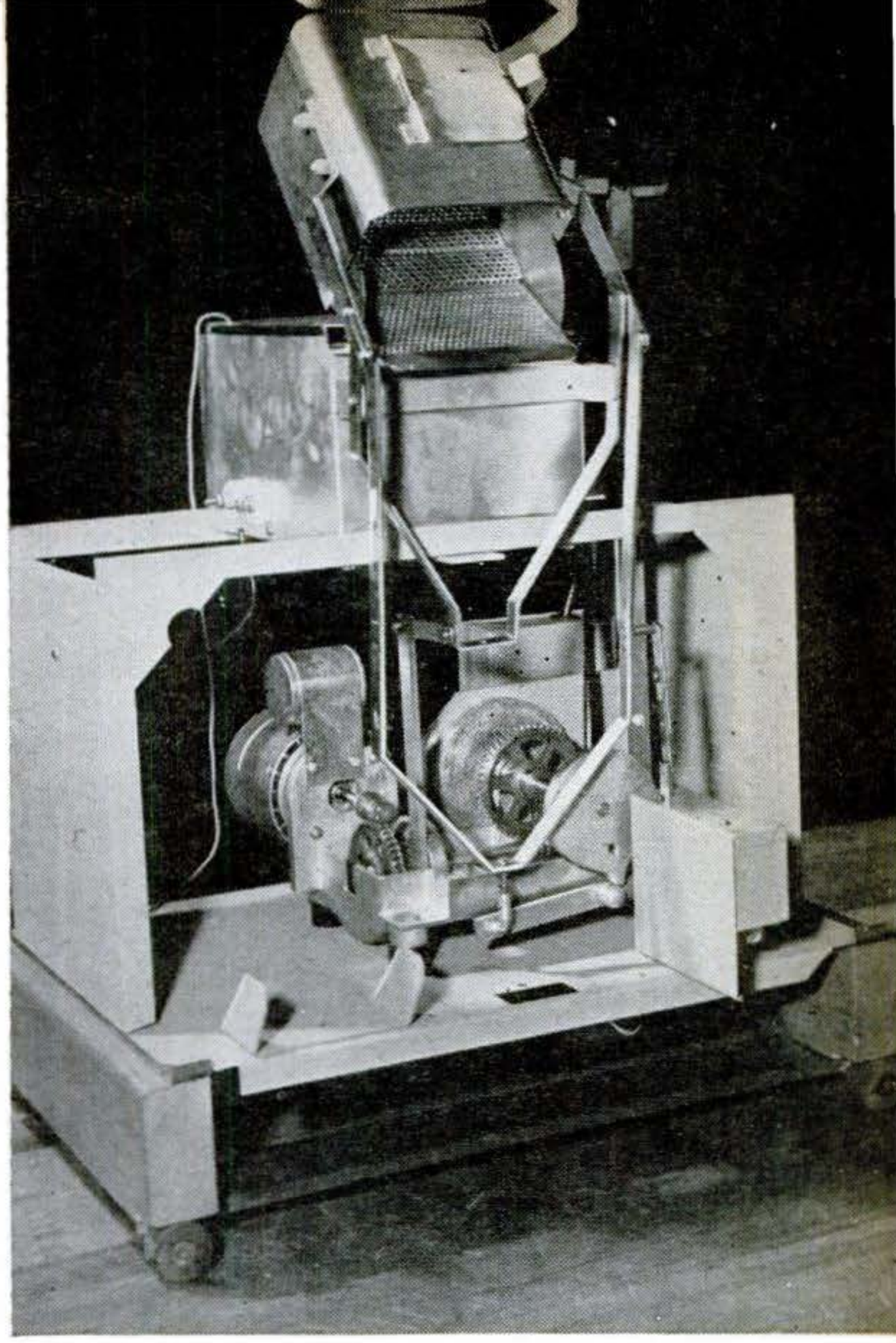
Aside from the ubiquitous cigarette, candy, gum and nut machines, a coin or coins (from a nickel to a quarter) today will pop, butter and package a bag of popcorn for you; will mix you a drink of any of three selected flavors; shine your shoes; deliver an electronically heated sandwich or hot dog; record your voice or take your picture; sell you ice cream, milk or hot coffee (black or with cream, with or without sugar); sell you a newspaper; write trip insurance or sell you a railroad ticket; give you the use of a typewriter, radio or television set; fill your lighter, or do your laundry. This is but a gleaning of what coin vendors have to offer. Of course, there are always the coin telephone, the subway turnstile, lockers and washrooms, and other coin-operated service devices.

There are two types of automatic vending machines: the mechanical, in which the coin becomes an integral part of the machine, enabling it either to drop or eject the product;

Copyrighted material

As coin starts motor, a cup of raw corn moves toward popping basket, the lid of which opens to receive it. The oscillating basket has a perforated bottom and rests in a reservoir of seasoned oil.

After 60 seconds of popping, the basket is lifted to the position shown above, causing its door to open and cascading the finished popcorn into the bag. Present models have external salt dispensers.

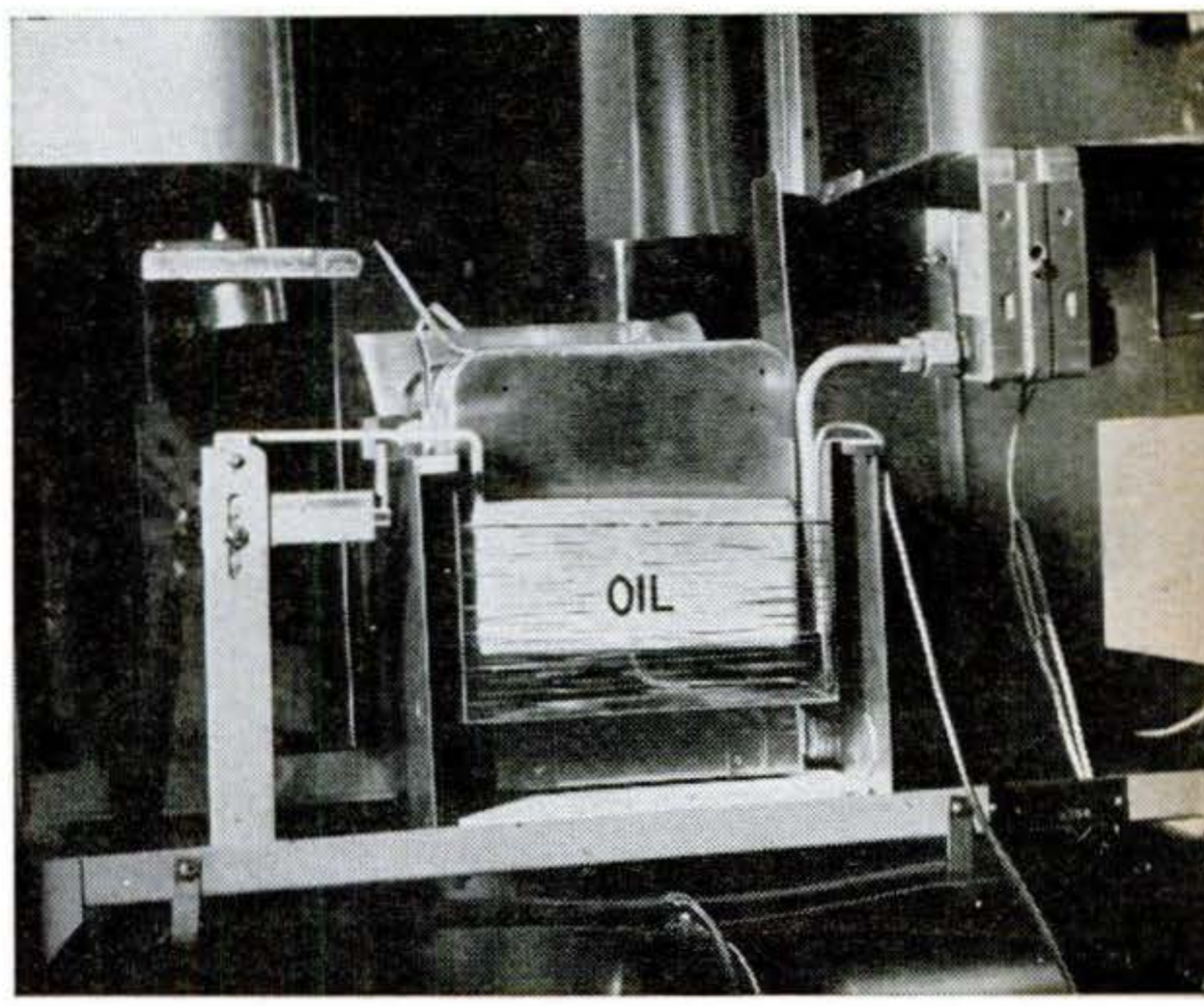


Lower part of the machine holds the constant-speed motor (left) that drives gear and cam assembly (right), controlling mechanical functions. A timing device prevents operation when temperature is low.

and the electrical, in which the coin closes an electric circuit that starts one or more mechanical and electrical operations.

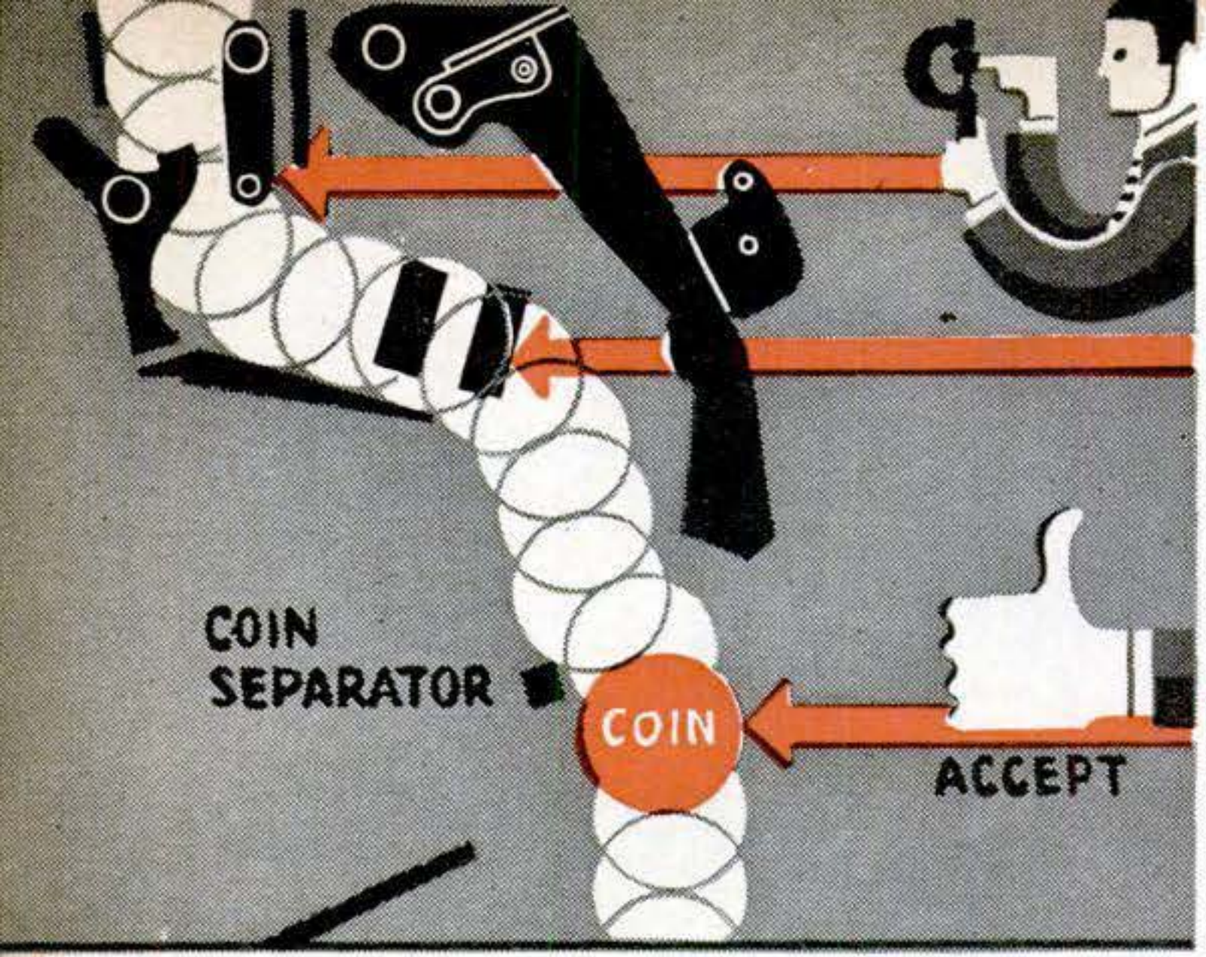
The heart of practically all vending machines is a mechanism that weeds out counterfeit and foreign coins and slugs. Even with this slug rejector, however, in an unlucky year vending-machine operators have lost some $5,000,000, not counting the pennies withheld by those who blew down the chutes of weighing machines to get a free weigh.

In a typical slug rejector, each coin is first checked for proper diameter and thickness. Badly nicked, warped or perforated coins are rejected. Next the coin passes through a magnetic field that rejects coins not containing the proper metal alloy. The coin rolls down inclined rails past the magnets, which tend to retard its travel. The type of metal or alloy in a coin determines the speed at which it leaves the inclined rails. If it is traveling

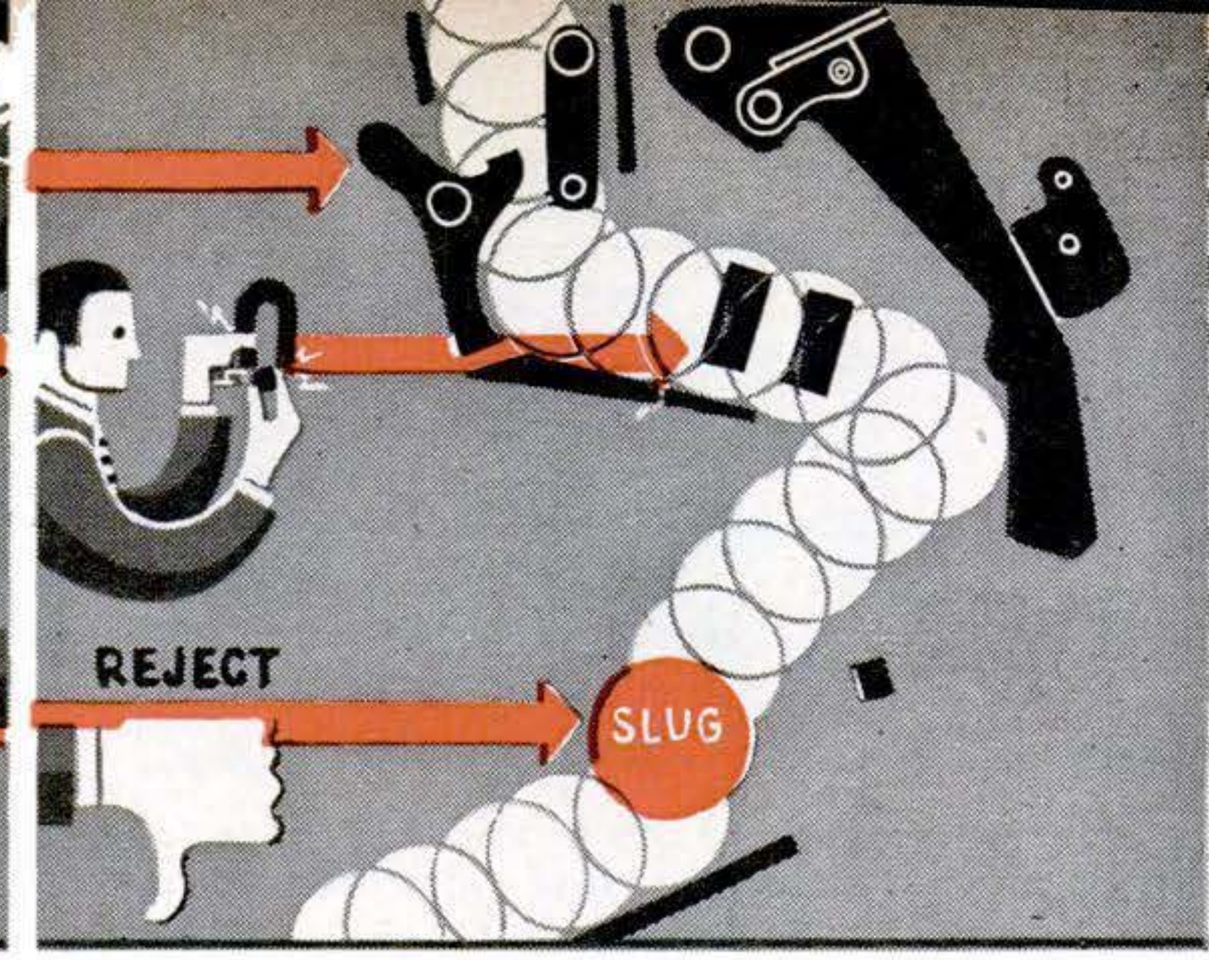


Basket rests ¼-inch deep in oil reservoir, which is kept at constant level. Float gauge connected with time switch (left) electrically controls valve of oil tank (right) to permit necessary gravity flow.

Copyrighted material



COIN ACCEPTED. Diagrammatic drawings of a typical slug rejector show how it tells the good from the bad. A coin first passes the test for size, then rolls down rails past magnets that test the alloy. When it is made of the proper alloy, the coin travels past the magnets at a speed that causes it to fall with its center of gravity to the right of the separator. This lands it in the accept channel and puts the machine in operation.



SLUG REJECTED. A slug of the wrong size would be caught at the start of the path. This one gets by, but the magnets spot it. A poorer conductor than a real coin, its magnetic response is less and it travels faster. It bounces off bottom of wiper blade, falls to the left of the separator and goes into the reject channel. A more conductive alloy would have been retarded by the magnets, fallen almost straight down, and met the same fate.

too fast or slow, the coin strikes reflectors or barriers and is deflected into the reject outlet.

The weight of the coin, its hardness and its elasticity are also tested; if not up to par, it falls short of or beyond the "accept" path.

Most unacceptable coins or slugs are immediately channeled to reject outlets. Slugs trapped because of wrong size or held by the magnets, however, are released by a wiping mechanism that sends them to the reject outlet.

One that Will Work

There *is* a slug of a certain alloy that will be accepted 100 percent by even the most sensitive slug rejector, but the less said about that the better. As a metallurgist who is now in the automatic vending machine business said, "I can make phony dimes that any machine will take, but they would cost about 20 cents apiece." Slugs for the penny and nickel slots are the easiest to make; as dimes and quarters are tested for silver content, the counterfeiter's task is made more difficult and hardly worthwhile.

Perhaps the most effective slug deterrent, however, is a law that makes it a Federal offense, punishable by a $5,000 fine or two years in jail, or both, to manufacture or use slugs.

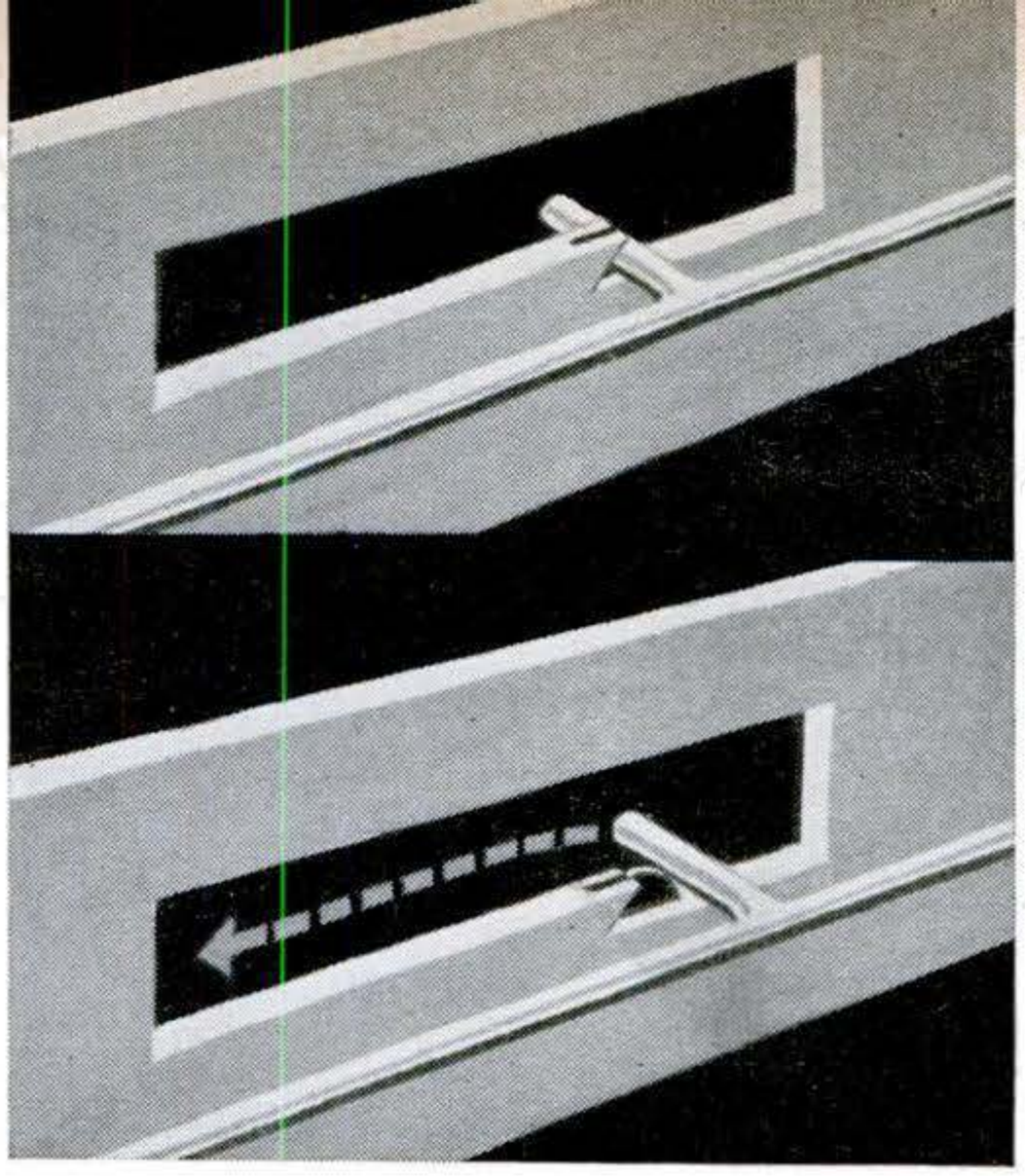
The mechanical slug rejector sends a genuine coin on its way to release an item of merchandise. But that wasn't enough for Charles F. Harris, executive of a southern railroad, who got thirsty while attending a murder trial one sultry day some years ago. He stepped into the corridor where there was a cold-drink vending machine, but he didn't have a nickel. As he wanted that drink badly, he had to go to a store several blocks away. When he returned to the courtroom his thirst was quenched, but someone had taken his seat.

Annoyed by this inability of the dispensing machine to make change, he got to work. Fifty-six models and several years later he came up with a mechanical unit that enables a vending machine to take a dime or quarter, sell a nickel product and return the proper change. Now the Harris Coin Changer, made by the Johnson Fare Box Company, is on the market, improved and adaptable to all types of automatic vending machines. One of many coin changers now on the market, it incorporates a feature that prevents it from "jackpotting," or returning a hatful of nickels in change for a quarter. (There are those who say that this feature has always been standard equipment on the one-armed bandits.)

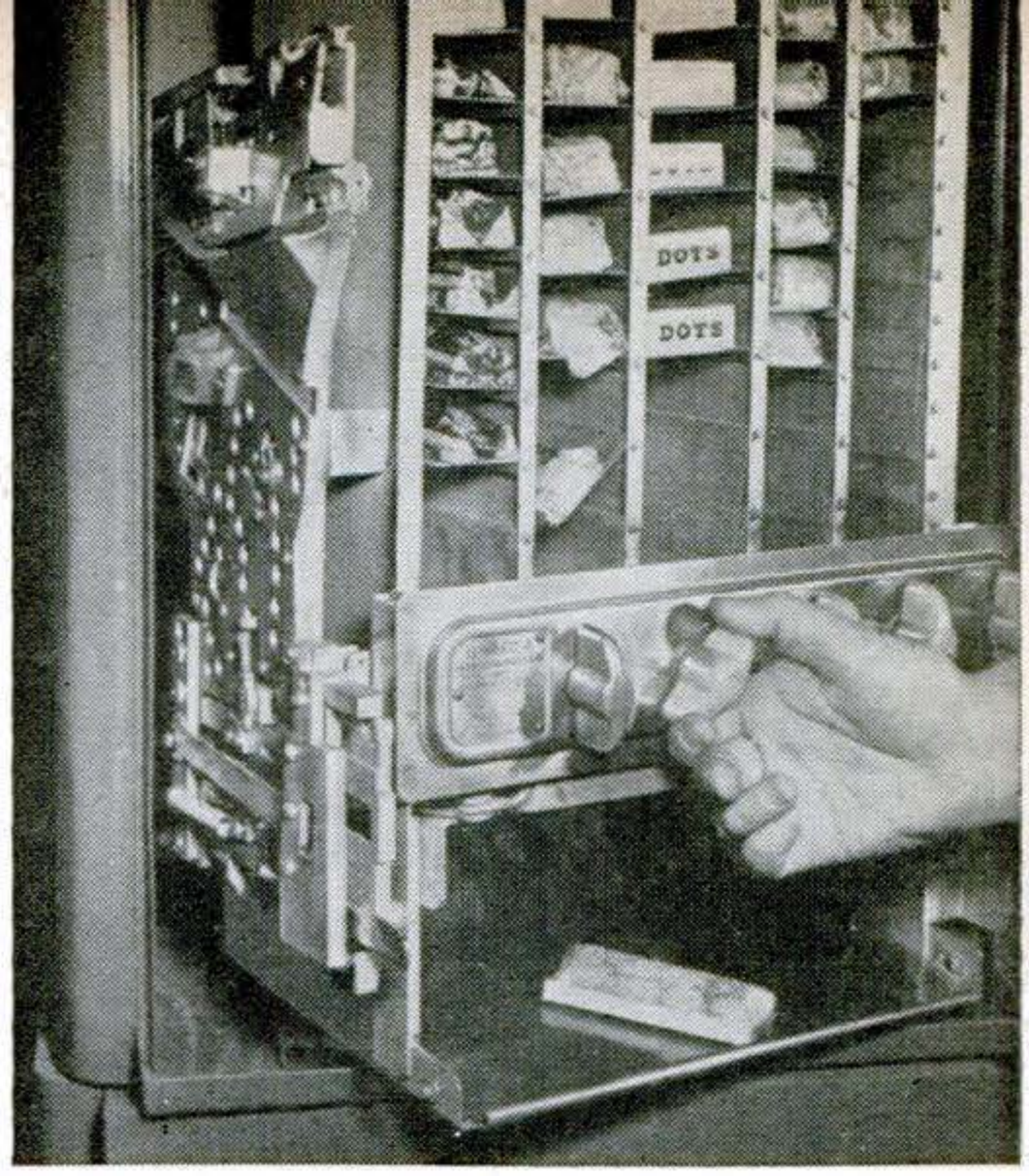
Another type of coin changer, the Vendo, is not a part of a vending machine, but a separate unit offered as a service at locations where there are a number of coin-operated vending machines. All coin changers obviously incorporate a slug rejector.

Although there are hundreds of different types of vending machines on the market,

Copyrighted material



The upper drawing shows how, without a coin, the operating pin of the mechanical type of vending machine is caught in a notch, freezing the mechanism. When a coin is inserted, as shown in bottom picture, it lets the pin ride over the obstruction.



A typical mechanical vendor. At left is the slug rejector. Genuine coins act as part of the machine, so that the turn of a knob operates a plunger, which in turn activates mechanism at the rear to release or eject product into dispensing compartment.

the basic operating principles are comparatively few. The simplest is the kind in which the coin or coins start an electric timer that permits the use of some standard piece of equipment, such as a radio, an electric washing machine, or a typewriter, for a predetermined period of time.

In the familiar multiple-choice mechanical cigarette and candy vendors, the coin, as mentioned before, becomes an integral part of the machine's mechanism. Without a coin, the operating rod of the machine is caught in a notch when the selecting plunger or handle is operated. When a coin is inserted it falls into a slot that allows the pin of the operating rod to ride over the notch, activating a mechanism at the back of the machine that releases or ejects the selected item.

In one version of this type of machine, the activating mechanism releases a trapdoor that drops the product down a chute into the delivery opening. In another, the products are placed in shelves that form an endless chain. To make his selection, the purchaser turns a knob that brings the desired item into a position usually indicated by an arrow. The coin is inserted and the pushing of a plunger, pulling of a handle or twisting of a knob results in the bar of candy or package of cigarettes being ejected from the machine.

This endless-chain type, because it holds a selection of 50 to 150 titles, is being adapted for the sale of Pocket Books for a quarter-in-the-slot.

In electrically operated vending machines, the coin closes an electric circuit that starts one or more operations, either ejecting or releasing a packaged product or actually preparing a product—mixing a cold drink, heating a hot dog or popping corn.

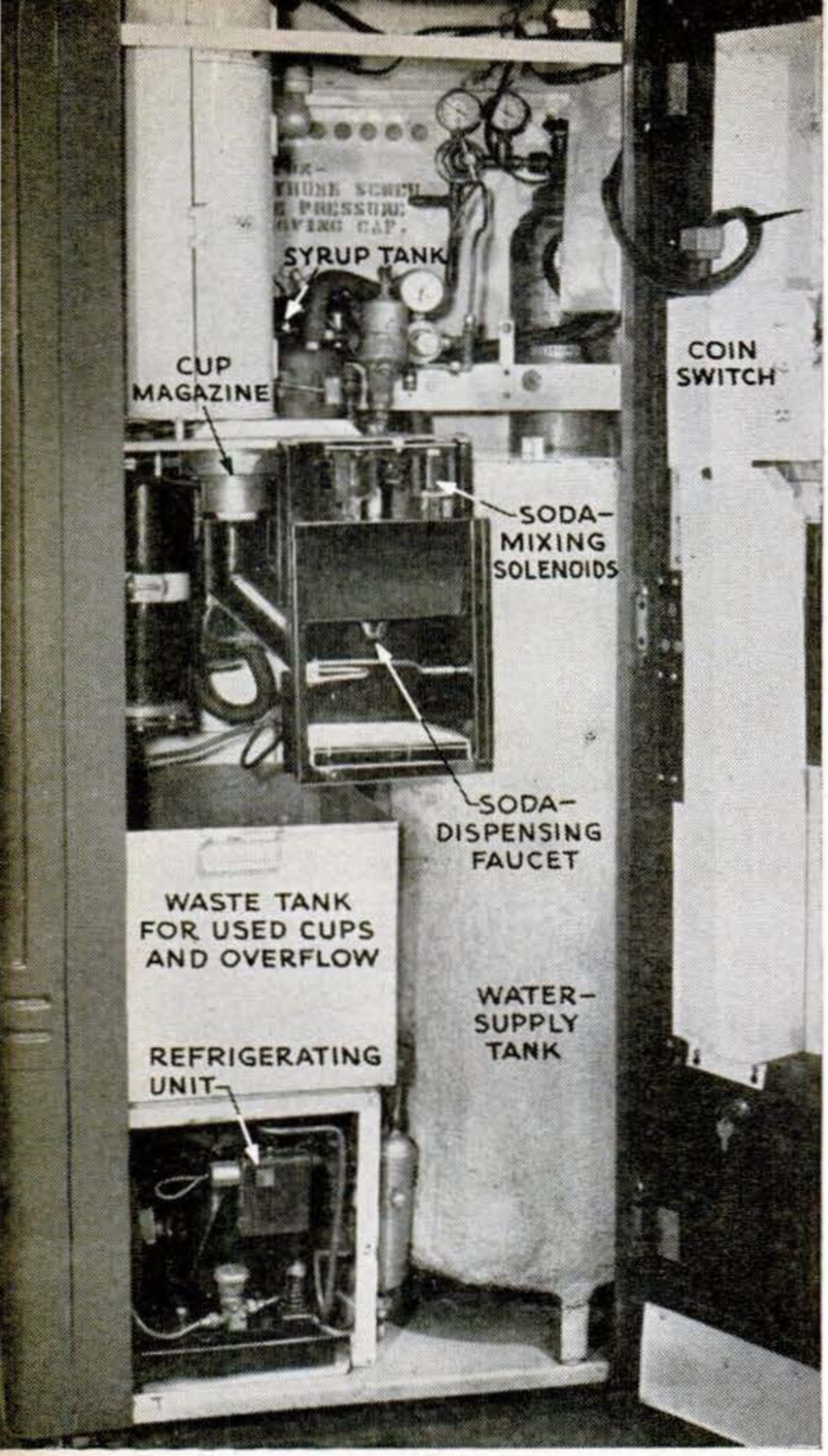
The Minit-Pop, manufactured by the Viking Tool and Machine Corporation, of Belleville, N. J., is a good example of the new types of coin-operated machines coming on the market. In return for a dime, this machine takes raw corn, pops it in front of your eyes, and delivers the hot, freshly popped product in a glassine-lined bag.

Hunting for an Oil

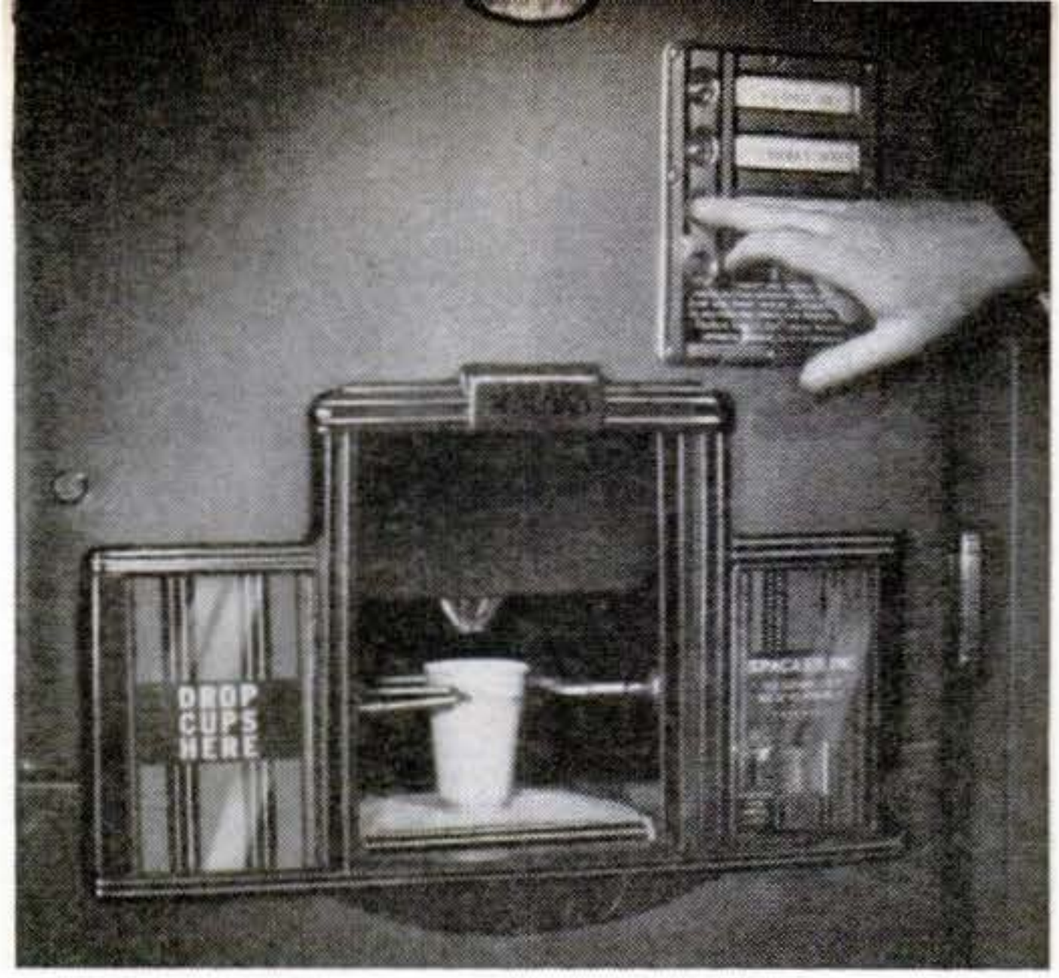
Perfecting of the Minit-Pop involved the manufacturer in a variety of research problems. Scores of edible oils were tested before a variety of peanut oil was found that would taste like butter and still not become rancid. It was found that popcorn has a critical "popping" temperature of 410°. A deodorizer had to be devised. Although a well-known fact to the National Association of Popcorn Manufacturers, the Viking people were amazed to learn that unlike ordinary table salt, which has only 6,000,000 grains to the pound, popcorn salt has 60,000,000 grains, the better to sift through a bag of popcorn and into the crevices of every kernel.

Another new electrically operated machine, although not strictly a merchandiser,

Copyrighted material



Front interior view of the Spacarb, one type of the coin-operated soda-dispensing machines now on the market. Enclosed unit on door at right contains the slug-rejector. The carbonating unit produces a continual supply of fresh soda water. Improved versions of the automatic soda fountain are on the way.



New soda vendors feature an ice-cold drink in any one of three flavors. Coin starts operation and drops the paper cup into place. Those quick on the button can snatch a dash of a second flavor.

is the Insurograph. Now in use at several air-line terminals, it sells air-trip insurance at a quarter for each $5,000 policy. The coin starts a series of operations that begins with the stamping of the date, hour and minute, plus a facsimile signature of the insurance agent. Next a slide uncovers a blank policy that the applicant fills in, after which he presses a button that delivers the policy to a receptacle at the front of the machine. A duplicate policy is retained in the machine to be collected later and sent to the insurance company.

The thoroughness with which the new vending machines are engineered and tested indicates the industry's realization that success depends on pleasing the public and offering machines that will operate under trying conditions. The C-8 Corporation, of Newark, New Jersey, for instance, runs continuous tests on the parts of their new electrically operated cigarette machine. When the tooth of an alloy ratchet wheel broke after 70,000 revolutions, the equivalent of five years of normal operation, it was immediately replaced by a sturdier steel wheel.

This Electro cigarette machine has several new features. Since it is activated by slight pressure on a selector button, it escapes the wear and tear of the mechanical type, which seems to inspire the customer to test his strength in pulling the selecting handle or plunger. Also, its electric coin counter is so rigged that one machine can sell products of three different prices.

By the Back Door

Refrigeration came to the vending machine industry via the back door in 1927. At that time a group of financiers invested $1,000,000 in the patent rights of a quarter-operated picture-taking machine. It worked fine, except that there was no way of maintaining the developing chemicals at a necessary temperature of 65°. To protect their investment, the backers financed the development of a refrigerating unit and a cooling tank. This in turn led to the introduction of a number of machines selling chilled drinks, and later to ice cream and milk vendors. As yet there are no automatic coin-operated vendors of frozen foods on the market. Freez-O-Mat, however, has a nonautomatic model that can easily be redesigned for

Copyrighted material

Selling trip insurance at 25 cents per $5,000 policy by automatic coin machines has proved so successful at several air-line terminals that the service may be extended to railway stations and bus depots.

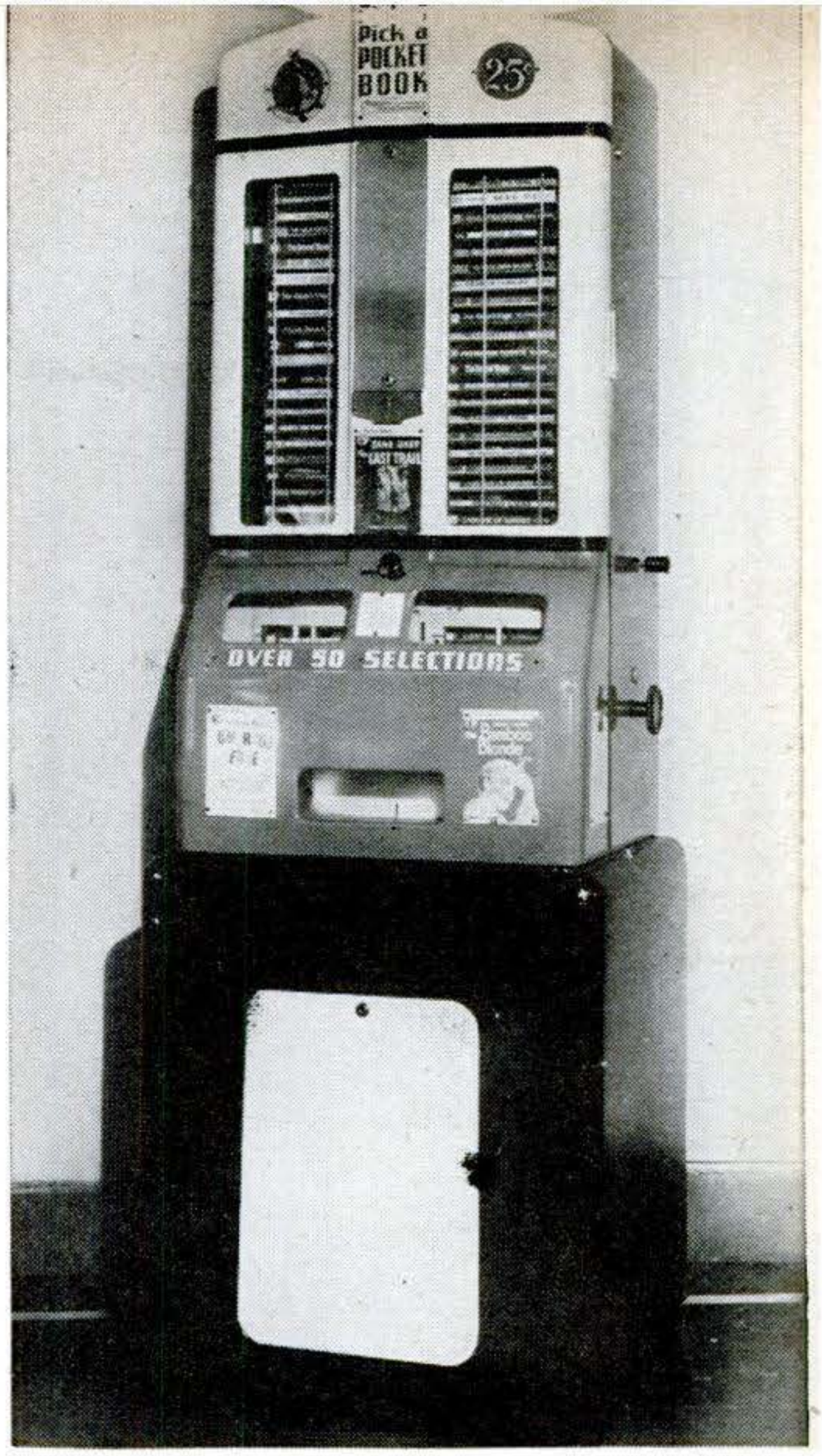
automatic operation. It is only a matter of time before both perishable and nonperishable foods are sold the coin-operated automatic way.

Although not yet on the market, Gasoteria's entry in the field of automatic merchandising will be good news for motorists, who know that gas tanks have a habit of running dry late at night or at other times when filling stations are closed.

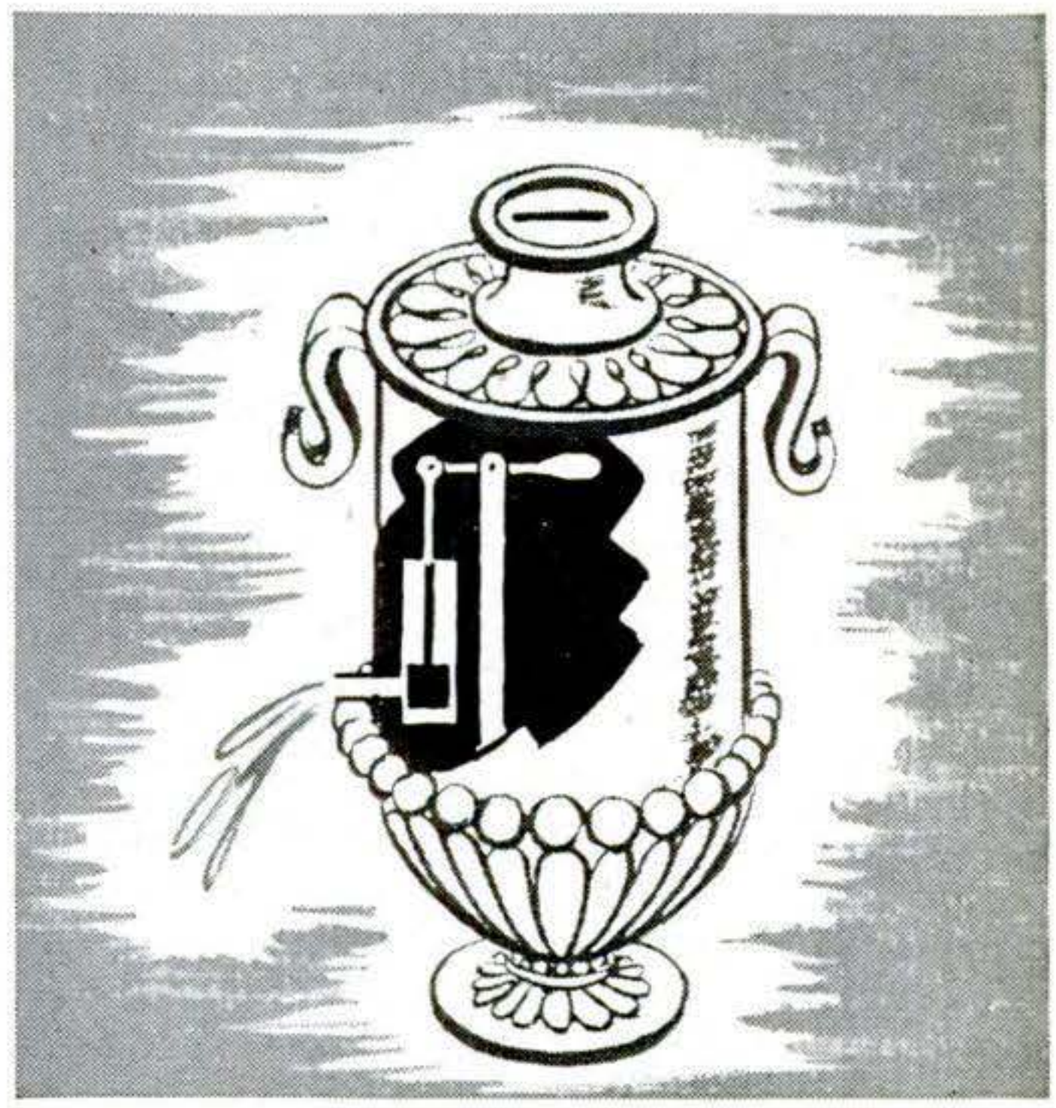
Buying on Credit

This new device is simply a coin-control unit that will interlock with the regular gas pump mechanism for automatic operation when the station is unattended. When coins are inserted (nickels, dimes and quarters), a credit is set up for the amount put in, and the pump is automatically set for the withdrawal of the equivalent value in gasoline. If the motorist overestimates, a "nonspill" nozzle will keep the tank from overflowing, and change will be returned for the amount of gasoline not taken.

Despite the fact that shortages of materials and some products are holding up many new developments, the automatic vending industry is optimistic about the future. It can also look back to quite a past. More than 2,000 years ago, Hero of Alexandria, considering the convenience of temple visitors, invented a mechanical vending machine—a vessel that took a five-drachma coin in the slot and spouted a measured quantity of sacrificial water. But not until the slug rejector was developed to overcome human nature did vending machines become big business. END



The Book-O-Mat, with its two endless-chain conveyors, holds up to 150 25-cent books, and a customer can choose any one of the different titles. One-third of the machine's contents is always visible.

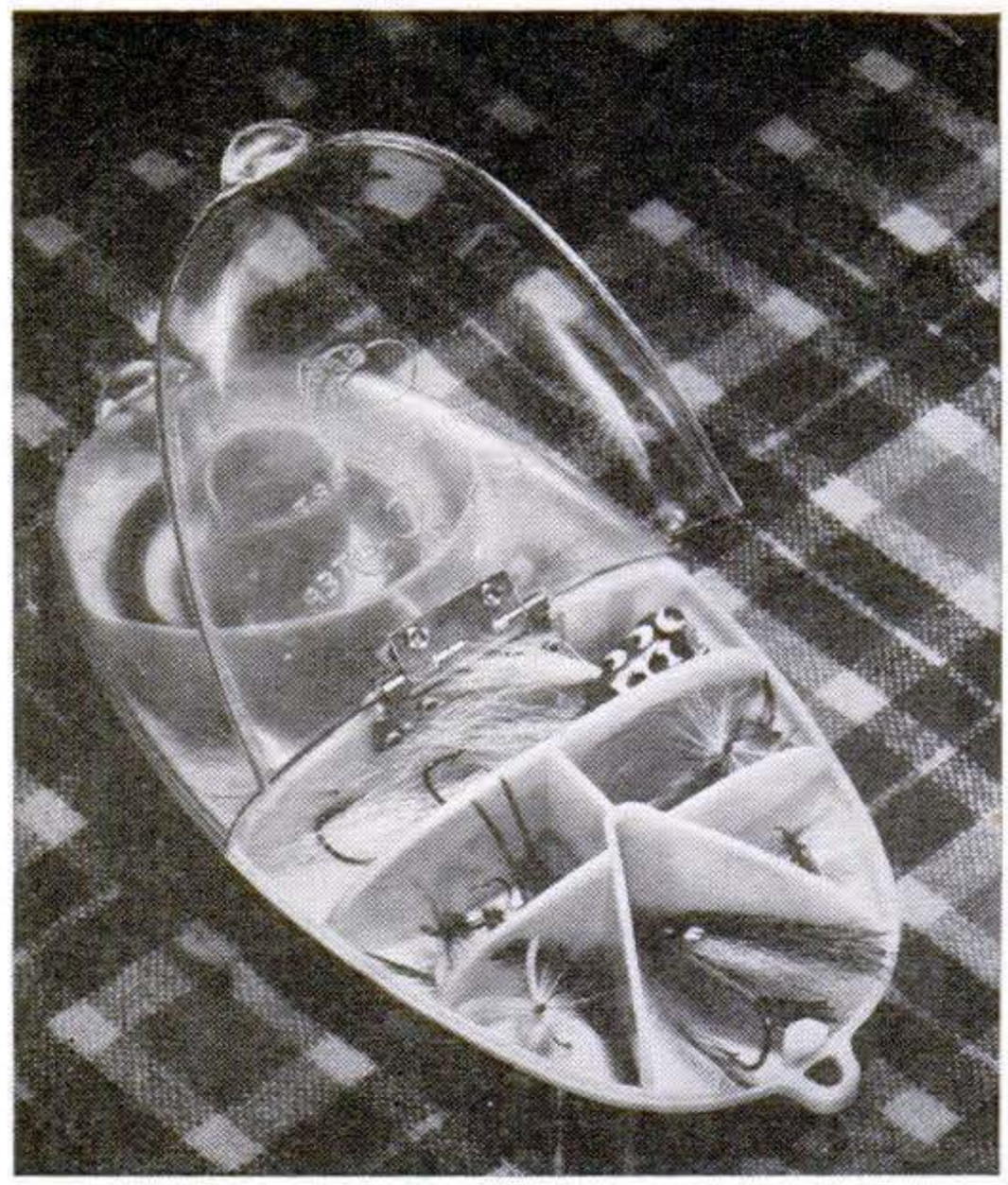


Hero of Alexandria invented this vendor some 2,000 years ago. A coin dropped in the slot hits a spoonlike plate, depressing it and opening valve. When coin slips off, flow of sacrificial water stops.

Copyrighted material

AIDS TO MODERN LIVING

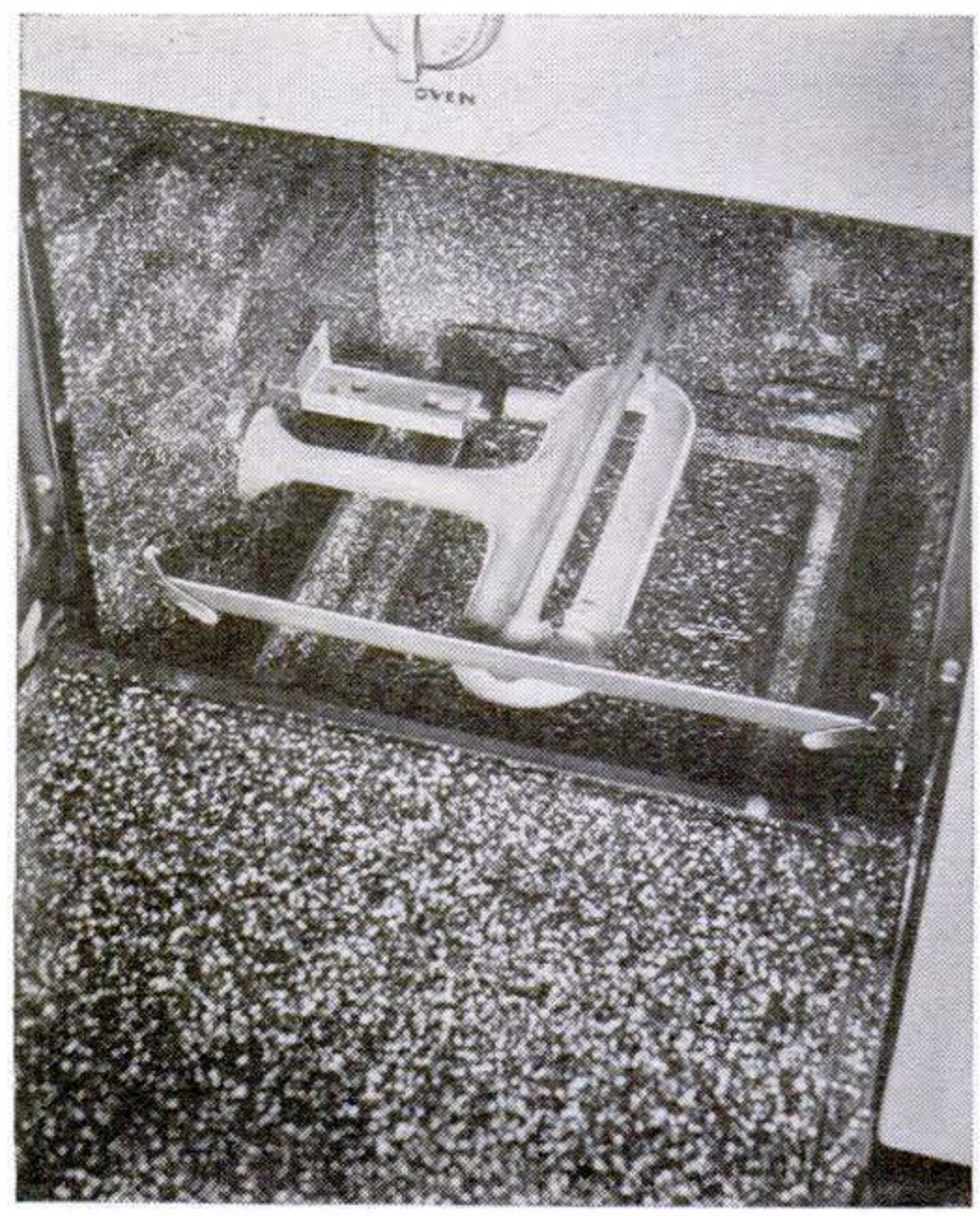
FLEXIBLE PLASTIC BOWLS. Kitchen bowls made of plastic by Tupper Plastics, Inc., of Farnumsville, Mass., bend easily, making it possible to pour liquids from them as you would from a pitcher without need of a funnel. The bowls are cleaned by flexing to loosen dried-on food, and then washed in warm water. They are sold in nests of three sizes—5½", 6¼", and 7".



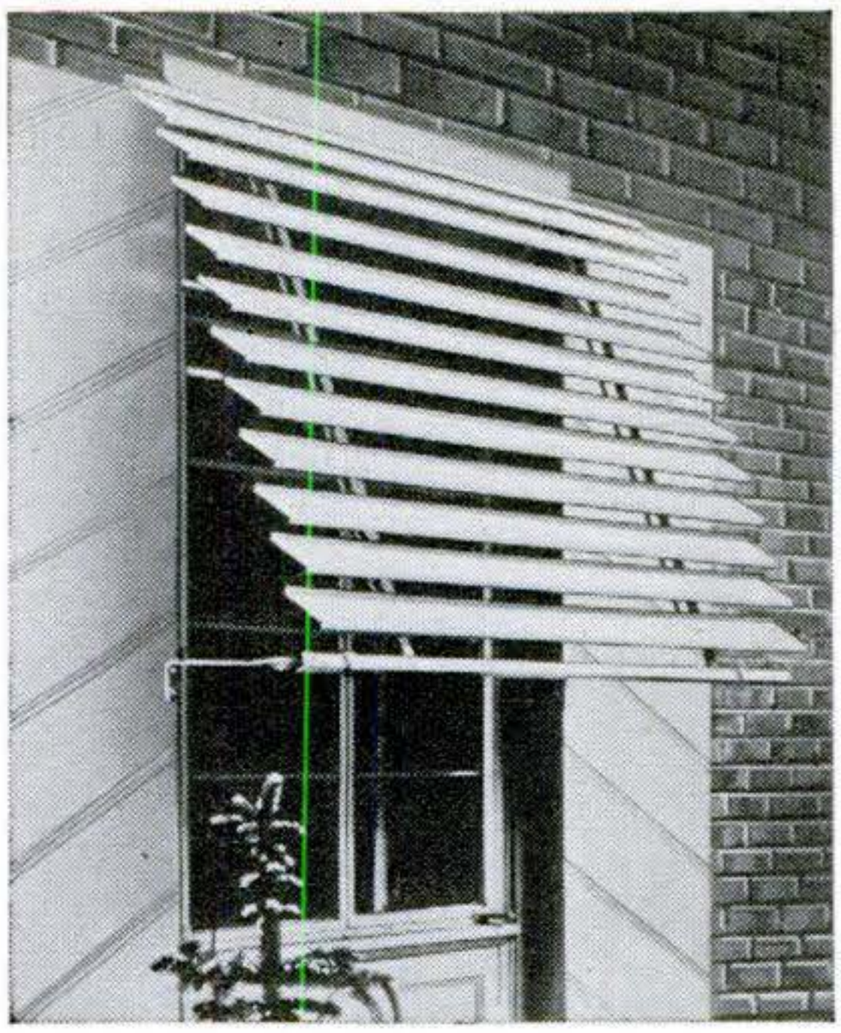
FISHERMAN'S FLY BOX. A plastic fly box with a number of separate compartments is produced by the Tru Art Fly Co., of Gardner, Mass., to enable the fisherman to keep flies readily accessible and untangled even if the box is upset or carried on end. A transparent lid permits the contents to be seen at a glance. Separate compartments for leaders and line dressing eliminate any need for carrying extra boxes.

AUTOMATIC RANGE LIGHTER. Eliminating the need for stooping with a lighted match, a new lighter on many gas ranges now being made provides automatic ignition for the oven and broiler burners when the valve controlling the flow of gas to them is turned on. The lighter has been tested and certified by the American Gas Association. It is adaptable to three kinds of modern oven and broiler ignition—flash tube, gas pilot, and electric hot wire.

The association reports that gas-range users will find cycling flash-tube ignition advantageous since this type does not require an extra constant-burning pilot or an electric current to control the flow of gas. All the lighters provide safety, turning off the gas automatically if either the burner or the pilot goes out. The valve opens and shuts every time the oven or broiler is operated, constant use keeping it from sticking, and gas can flow only when there is a flame to ignite it the moment it is turned on.

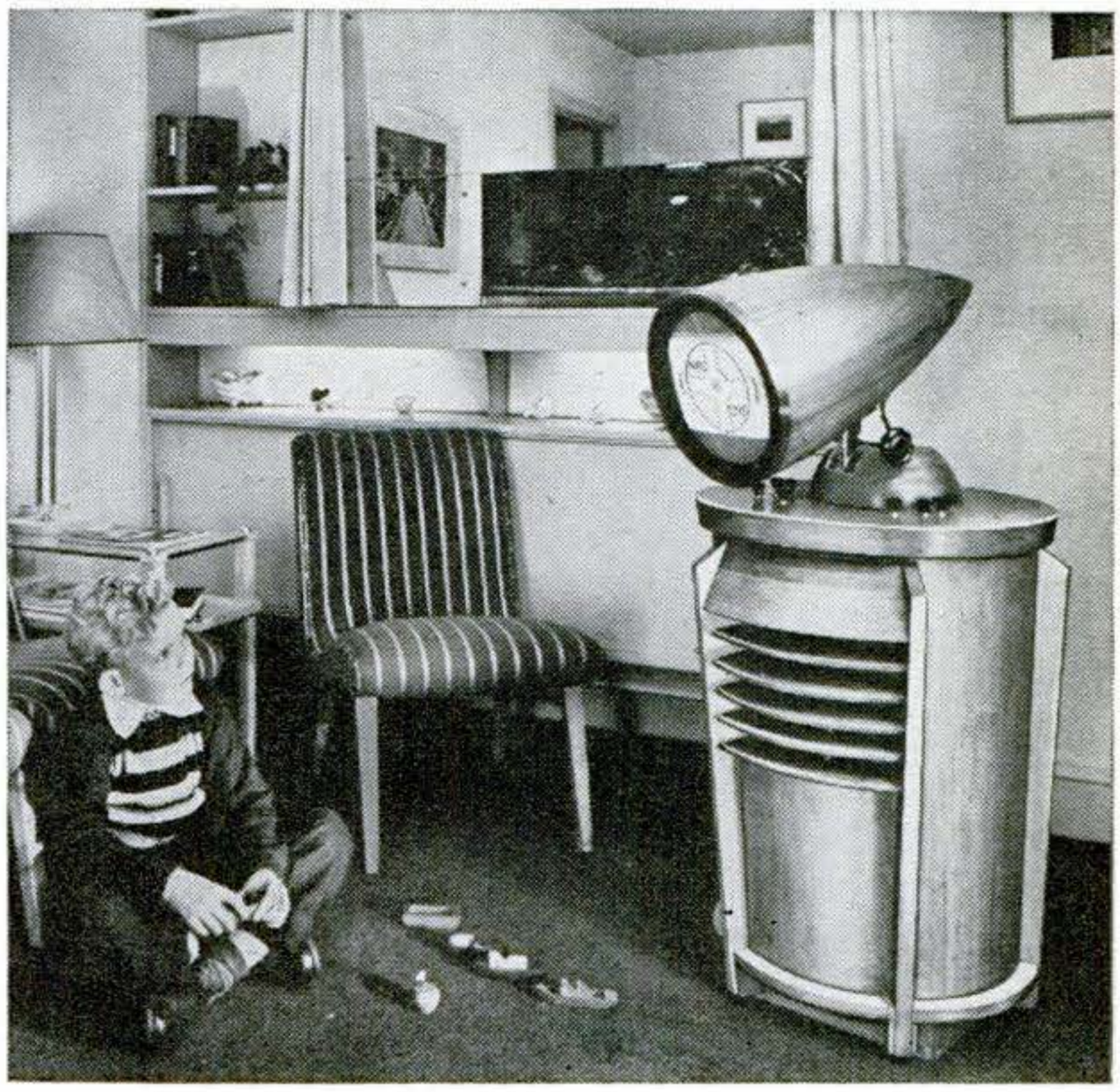


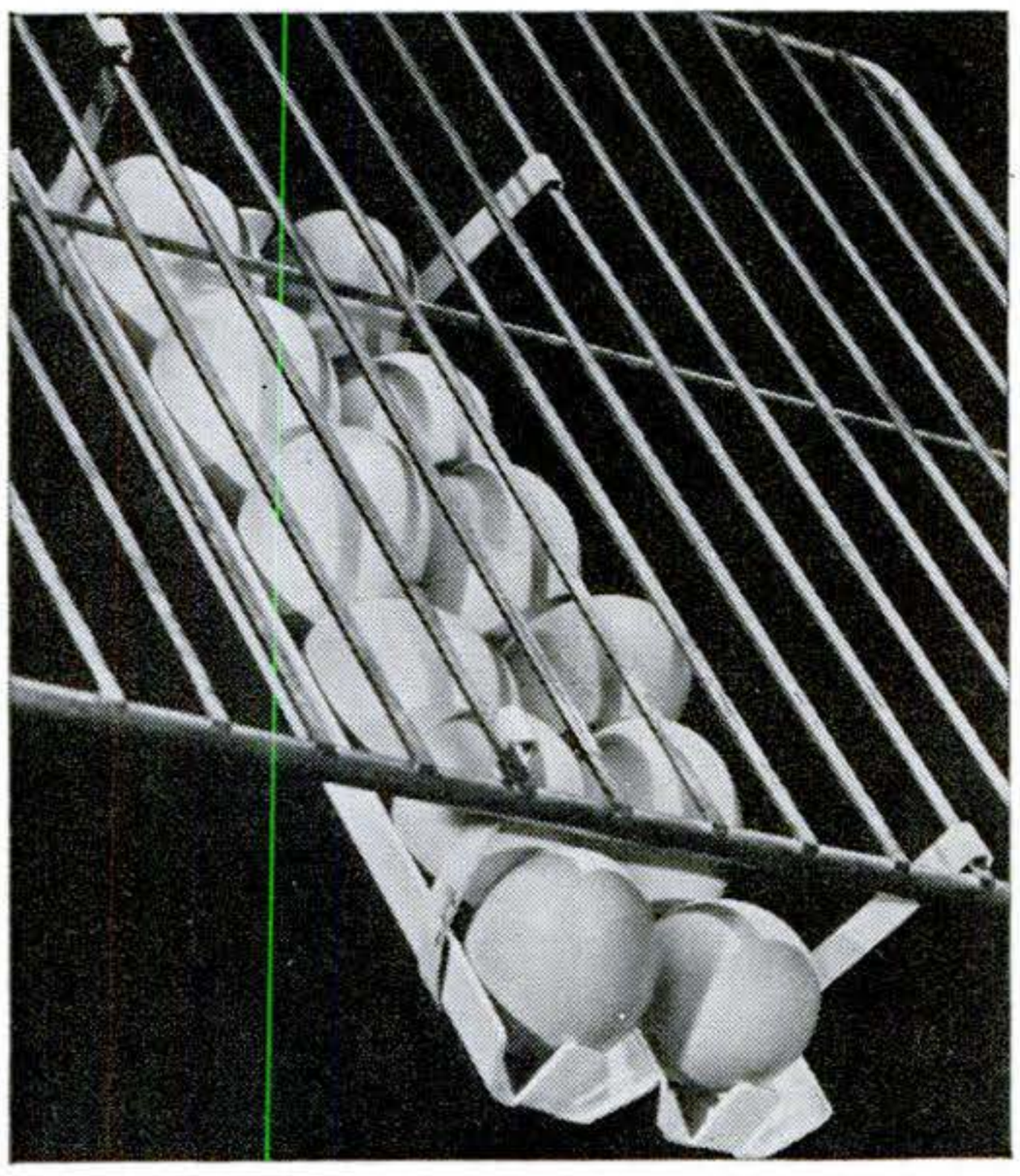
Copyrighted material



VENETIAN-BLIND AWNING. Features of both an awning and a Venetian blind are combined in a metal awning made by the F. C. Russell Co., of Cleveland. Operated by a crank inside the room, the blind can be adjusted to permit full ventilation and light or closed for a fully opaque awning. Baked-on enamel makes it rustproof.

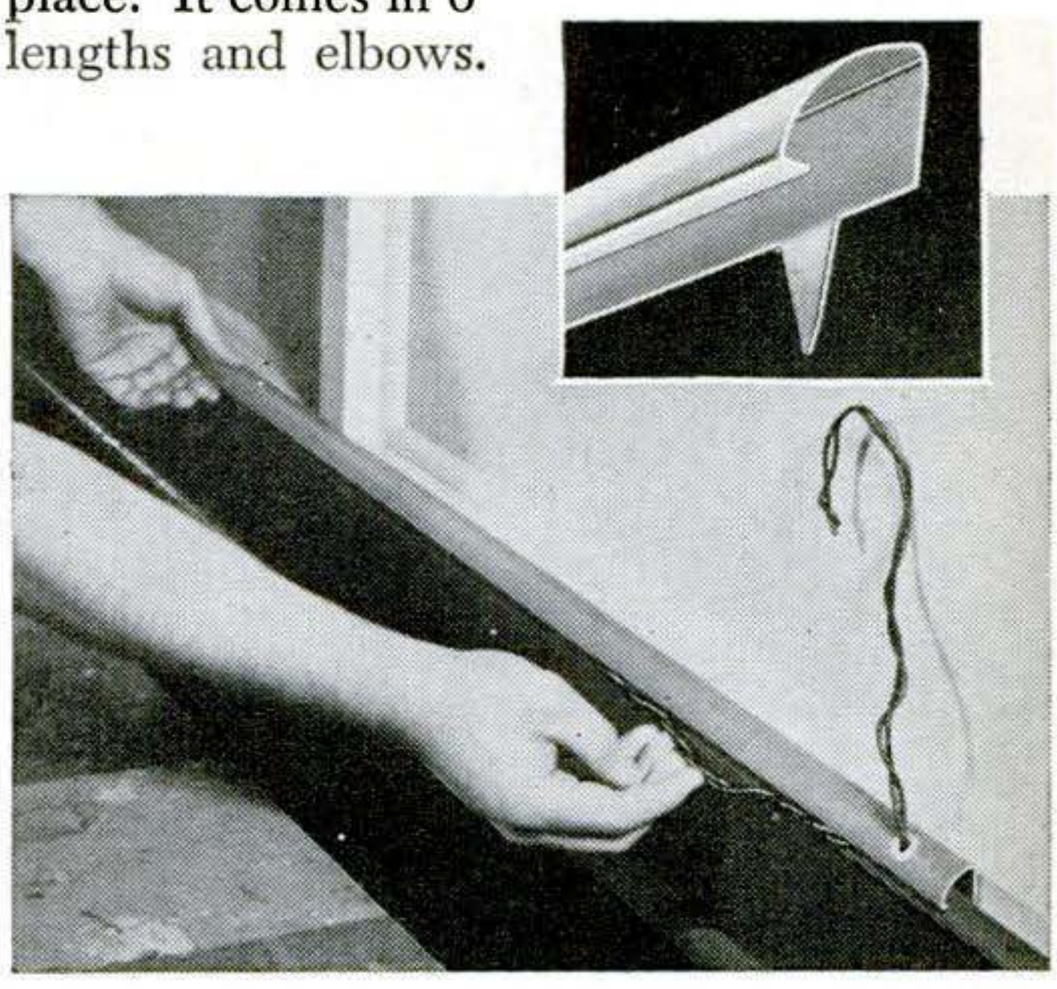
ADJUSTABLE TELEVISION SCREEN. A television set with a screen that can be swiveled from side to side or up and down to suit viewing conditions has been designed by Sylvania Electric Products, Inc. The set is built around the 10″ cathode-ray receiving tubes manufactured by the company.





SLIDING EGG TRAY. Hooked under a shelf, an egg tray made by the Davies Tool Engineering Co., of Camden, N. J., utilizes waste refrigerator space. The tray holds 14 eggs and slides forward for accessibility.

HOLLOW STEEL MOLDING. Used in place of ordinary quarter-round wood strip, a quarter-round steel molding produced by the National Electric Products Corporation, of Pittsburgh, serves both as a decorative trim and a raceway for telephone, buzzer, intercommunicator, and other low-potential wiring. Prongs spaced at 3″ intervals are pushed behind or under the baseboard to keep the molding in place. It comes in 6′ lengths and elbows.

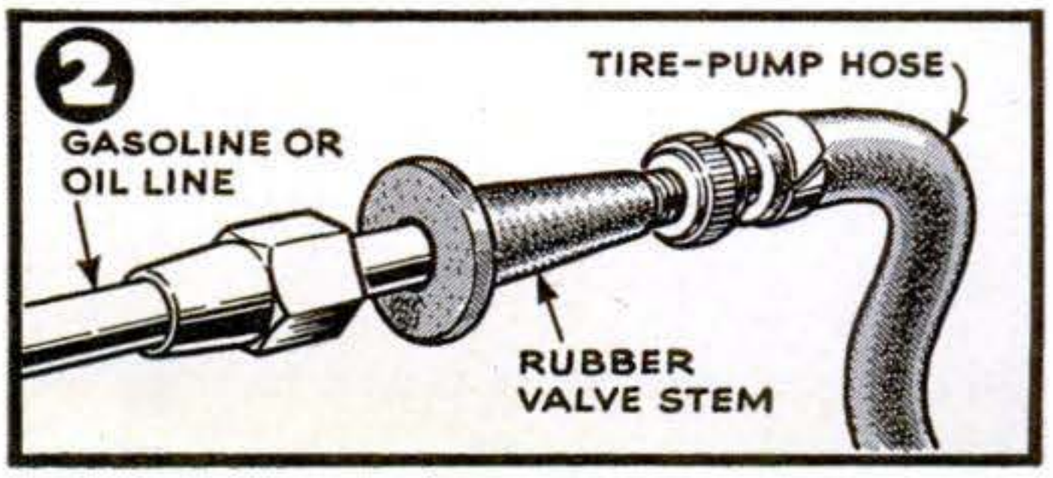


Copyrighted material

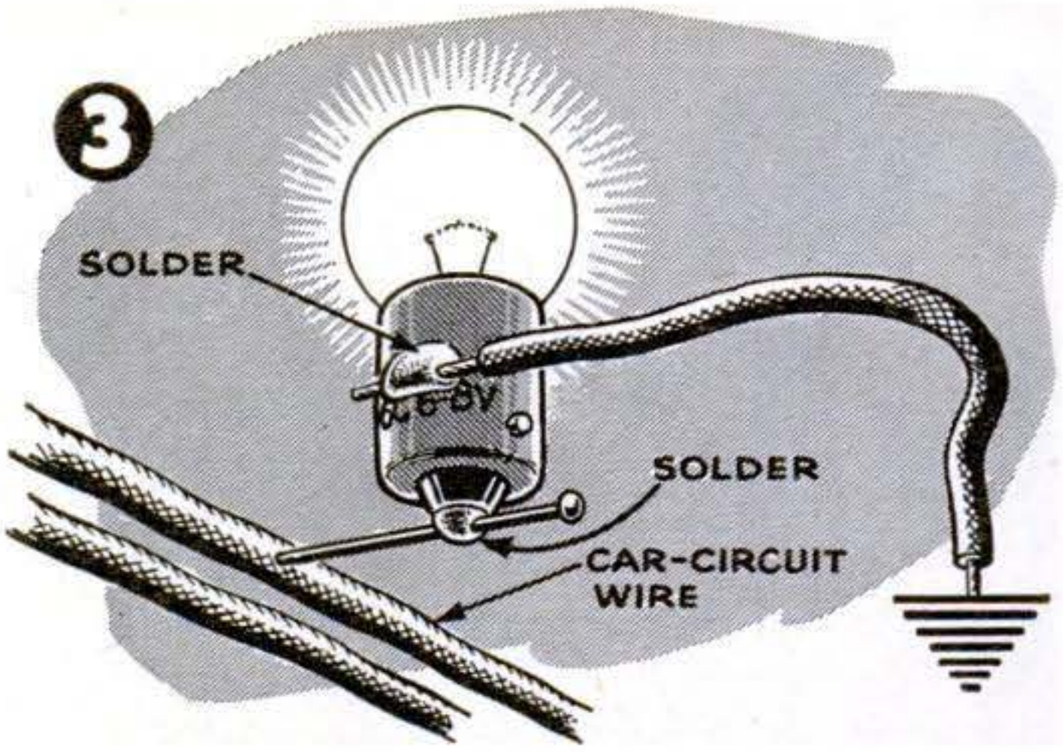
AUTO HINTS

1 FLUORESCENT CHECKS SPARK. If you touch the end of a fluorescent lamp to a spark plug, it will flash in time with the firing, and irregularities can be detected more easily than by screwdriver shorting. A lamp with a burned-out filament will work as well as a good one. Hold the tube by the glass.—LEONARD L. ALLEN.

2 PUMP CLEANS FUEL LINE. A gasoline or oil line may be blown out with a tire pump and a rubber valve stem cut from an old inner tube. Forced over the end of the line, the stem makes a handy hose coupling for a hand pump.—W. H. LOWRY.



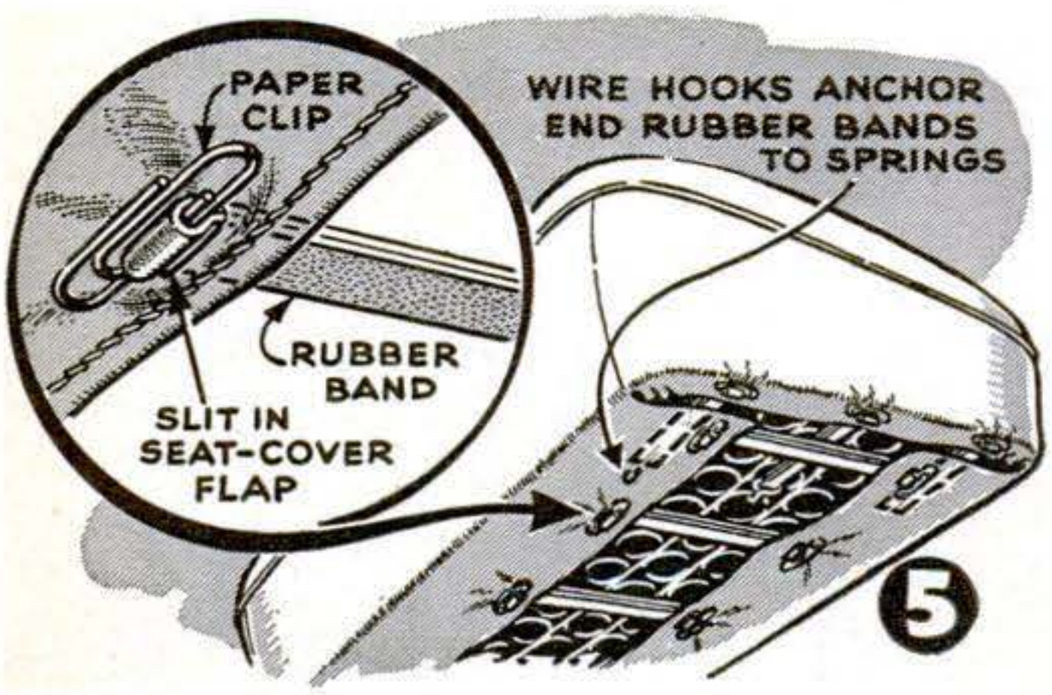
3 PIN LOCATES WIRE. Faced with the problem of finding the leads of my high and low-beam headlights in a maze of discolored wires, I turned on the high-beam lights first and used this device, sticking the pin into one wire after another until the bulb lighted.—SAMUEL LANDOW.

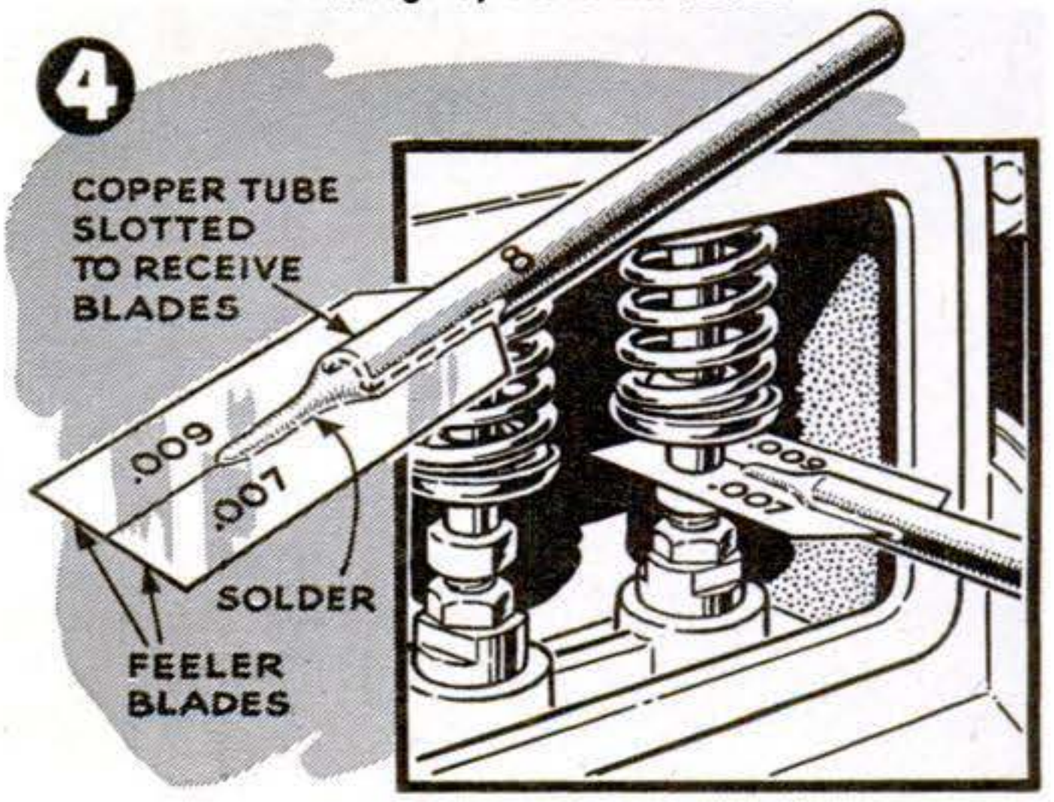


4 GAUGE ADJUSTS VALVES. A "go-no-go" feeler gauge makes it simple to adjust valves accurately. Intended for a clearance of .008", this particular gauge was made from feeler stock (available at auto supply houses) of .007" and .009". Adjustments are made until the .007" blade passes freely between the valve and tappet, but the .009" one will not go.—D. W. BRENTLINGER.

Drawings by STEWART ROUSE

5 SEAT COVERS KEPT SMOOTH. Inner-tube rubber bands attached to a seat cover in this manner will apply constant tension and prevent wrinkles.—H. G. WEBER.





Copyrighted material

GUS Short-Cuts a Long Job

By Martin Bunn

MEL MOWBRAY'S voice, as it came over the wire into Gus Wilson's Model Garage, was one of desperation and gloom.

"I'm in trouble, Gus," Mel said. "My crop of tomatoes has to get to the cannery by morning, and my truck has broken down."

"What's wrong with it, Mel?" Gus asked with real concern. Mowbray operates a small farm some 20 miles from our town, and he and Gus are old friends.

"I started to move the tomatoes out of the field this afternoon," Mel told him, "and on the third load something happened to the truck. All of a sudden it started to vibrate so bad it nearly shook me off the seat."

"Any idea what caused it?" Gus urged.

"Sounds like the bearing's gone on the end of that shaft that sticks into the flywheel," Mel answered. "I'm afraid to drive for fear I'll ruin the truck. But I've got to move those tomatoes before morning, and I can't hire or borrow another truck—they're all tied up this time of year. I know it's a long way, Gus, but can you come out?"

"It doesn't matter about the distance," Gus put in gently. "But you know how I feel about cutting in on another shop's business. You've always had your work done at Elmer Peters' garage out your way. Hadn't you better get him on this job?"

Mel's voice sharpened. "Elmer finished a complete overhaul of my truck just a couple of days ago, and he charged me plenty for it. Whatever's the matter with it now must be his fault. I'm through with that know-it-all. If you can't come out tonight, I'll tow the truck in to your place."

Gus glanced at the office clock. It was a few minutes to quitting time.

"I'll be along about half past six," he promised his farmer friend.

"We'll wait supper for you," Mel said.

Three quarters of an hour later Gus came to the crossroad that led to Mel's farm, steered his smooth-running old coupe off the highway's traffic-cluttered concrete, and for the first time in a couple of months heard the crunch of gravel under his tire treads. Wild flowers bloomed on the grassy banks that bordered the narrow road, birds sang, and somewhere back in the field a quail briskly reiterated, "Bob*white*, bob*white*, bob . . . *white!*"

Gus squinted into the glare of the low-swinging sun. "Why does a man live in a town?" he asked himself. Then he grinned. "Oh, what's the use—what would I do without a lot of cars to fool with?"

His nimble imagination went to work on the problem of Mel's truck, and by the time he had turned into the poplar-bordered lane that leads to the Mowbray house he had thought of half a dozen things that might be the matter with it.

Gus stopped his car in the barnyard. Mel, glumness written all over him, was standing there with a stoop-shouldered, hatchet-faced man who obviously was laying down the law. As Gus got out and walked toward them, he heard Mel say: "Here's the man who can fix it if anyone can."

"He'd better fix it quick if you expect to sell them termaters to me!" the sharp-faced man snapped. "I ain't goin' to tie up my whole works jest because you don't live up to your contract. If you ain't got 'em there by startin' time tomorrer mornin' I'll buy Zack Brown's crop, and you can sell your'n any place you can."

He gave Gus a hard-eyed look, stalked over to a shiny new sedan, and drove down

Copyrighted material

Mel's lane and onto the gravel road below.

"That's Duggins," Mel explained. "He owns the cannery, and he's a hard man to do business with. The price has dropped since he bought my crop standing, and he'd be glad of an excuse to get out of the deal. It would be pretty bad for me—I've counted on that tomato money."

"Cheer up," Gus encouraged. "Most balky trucks can be made to run. Where's yours?"

Mel pointed to a tomato-heaped 1½-ton truck standing at the edge of a field near several big piles of picked tomatoes. Hospitality and anxiety fought a battle in his face—and hospitality won.

"Mary's got supper ready," he said. "Let's eat. You can look at the truck later."

In the farmhouse kitchen they found buxom Mary Mowbray, her cheeks a shade redder than usual, waiting for them. Short notice hadn't kept her from setting a supper fit for any hungry man's appetite.

As Gus was finishing his second ample helping of deep-dish apple pie, they heard a car stop. A moment later a young man in a snappy summer suit and black-and-white sport shoes came in without knocking. He looked suspiciously at Gus, who recognized him as Elmer Peters, the smart-alecky proprietor of the near-by crossroads garage.

"Hello, folks," Elmer breezed. "Can't stop to eat with you. I'm as busy as a one-armed paper hanger."

He waited expectantly for a laugh and, when it didn't come, went on: "Dad Duggins stopped by and told me your truck's down, Mel. I don't see what can be the matter; it was O.K. when it came out of my shop. *That* I know—I went over it myself. But I'll take a look."

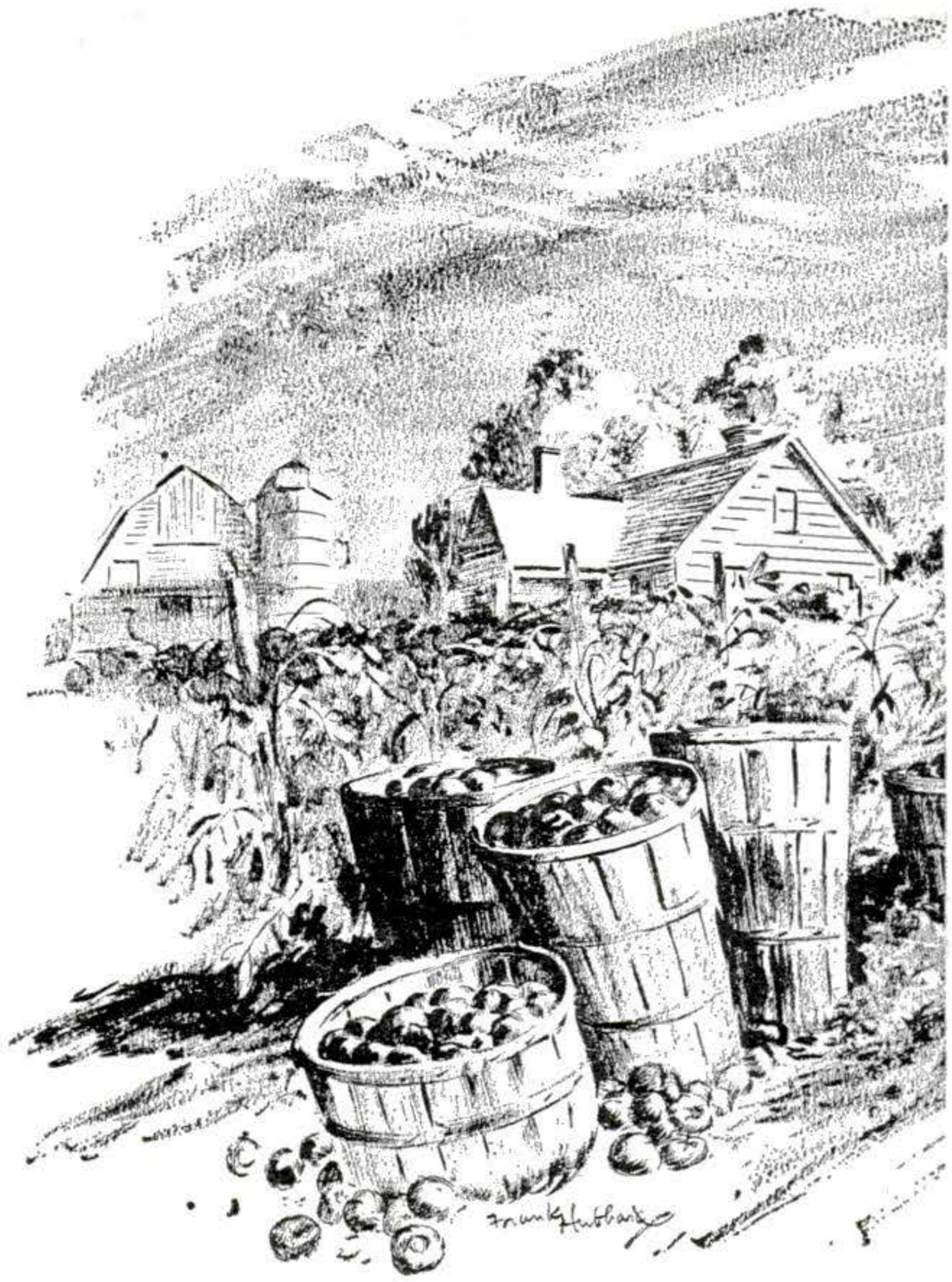
"All right," Mel agreed slowly. "Want to come along, Gus?"

As they followed Elmer out, Mel whispered: "I'd sure like to tell him what I think. Reboring the block, new pistons, new rings, new valves and guides, new bearing inserts—that overhaul cost a lot. But I don't dare; he's married to Duggins' daughter, and I can't afford a row now."

They walked over to the truck. "I left it right here in the field," Mel volunteered. "It sounded like the motor was tearing itself apart, and I didn't want to drive it out."

Gus watched silently as Elmer raised the hood and made a cursory inspection.

"Can't see anything wrong," the local garageman said. "Start 'er up."



Mel climbed behind the wheel, switched on the ignition, and pressed the starter button. The engine took off promptly, but there was a loud thumping noise and the truck shook so violently that he had a hard time keeping his seat.

"Shut 'er off—quick!" Elmer yelled, and Mel cut off the engine.

"Whatever it is, it's right here under the seat," Mel told him. "I can feel it."

Elmer scratched his head and looked helpless. "That's a new one on me," he admitted. "It must be a bearing burned out. I'll have to take the motor apart to find out. Probably ain't our fault, but if it is, I won't charge you a cent, Mel. You tow her over in the morning. Don't try to drive her."

"Can't fix it tonight?" Mel asked.

"Not a chance," Elmer answered airily. "My mechanics have gone home, and I can't do it myself. Gotta take my wife to a social at Dad Duggins' place."

Gus, who had been staring silently at the truck engine, decided that the time had come to take a hand.

Copyrighted materia

Gus wriggled out from under the engine. "What's happened to the pan under the front end?" he asked.

"It could be," he cut in, "that the trouble is something easier found and fixed than a burned-out bearing."

Elmer turned, with a sneer. "You an expert on truck motors?" he demanded.

"I've had a little experience," Gus admitted. "Switch on the engine, Mel."

"You're apt to ruin it," Elmer warned. "I won't be responsible if you do."

Mel looked at the young man, and then at Gus. He stepped on the starter button. The loud thumping began immediately.

"Listen!" Elmer yapped triumphantly.

Now, Mel's truck has two fan belts. Gus pointed at one of the pulleys. On each of its revolutions the belt going round bulged out sharply at one spot.

"So what?" Elmer asked scornfully.

"I'll show you what," Gus told him. "Cut the engine, Mel."

Instead of going at the fan belt, Gus got down under the front end. After a minute, he wriggled out again and got up.

"What's happened to the pan under the front end of the engine?" he asked.

Elmer turned red. "It was badly rusted, so I didn't bother putting it back," he explained. "Wasn't any use, anyhow."

"Oh, no?" Gus said. He got a screwdriver from the toolbox and gently pried a piece of a twig the thickness of a pencil from under the belt. "Start her up again, Mel," he said.

This time there was no vibration. Mel grinned. Elmer's mouth sagged.

"Just one of those things, Mel," Gus laughed. "You must have run over some brush, cut off this piece with the fan belt, and had it forced into the pulley V-groove. It couldn't have happened if that pan had been put back after the overhaul."

He stifled an impulse to chuckle at the look on Elmer's face. "Well, you're all right now, and I've had some of Mrs. Mowbray's apple pie. You drive that load of tomatoes over to the cannery, and when you get back I'll help you with more. . . . You'll be seeing your father-in-law this evening, Mr. Peters. Tell him he'll have plenty of tomatoes to get started on in the morning. Mel *wouldn't* want him to worry." END

Copyrighted material

With clean lines and built-in headlights, the 1947 Jowett "Javelin" has a decidedly American appearance.

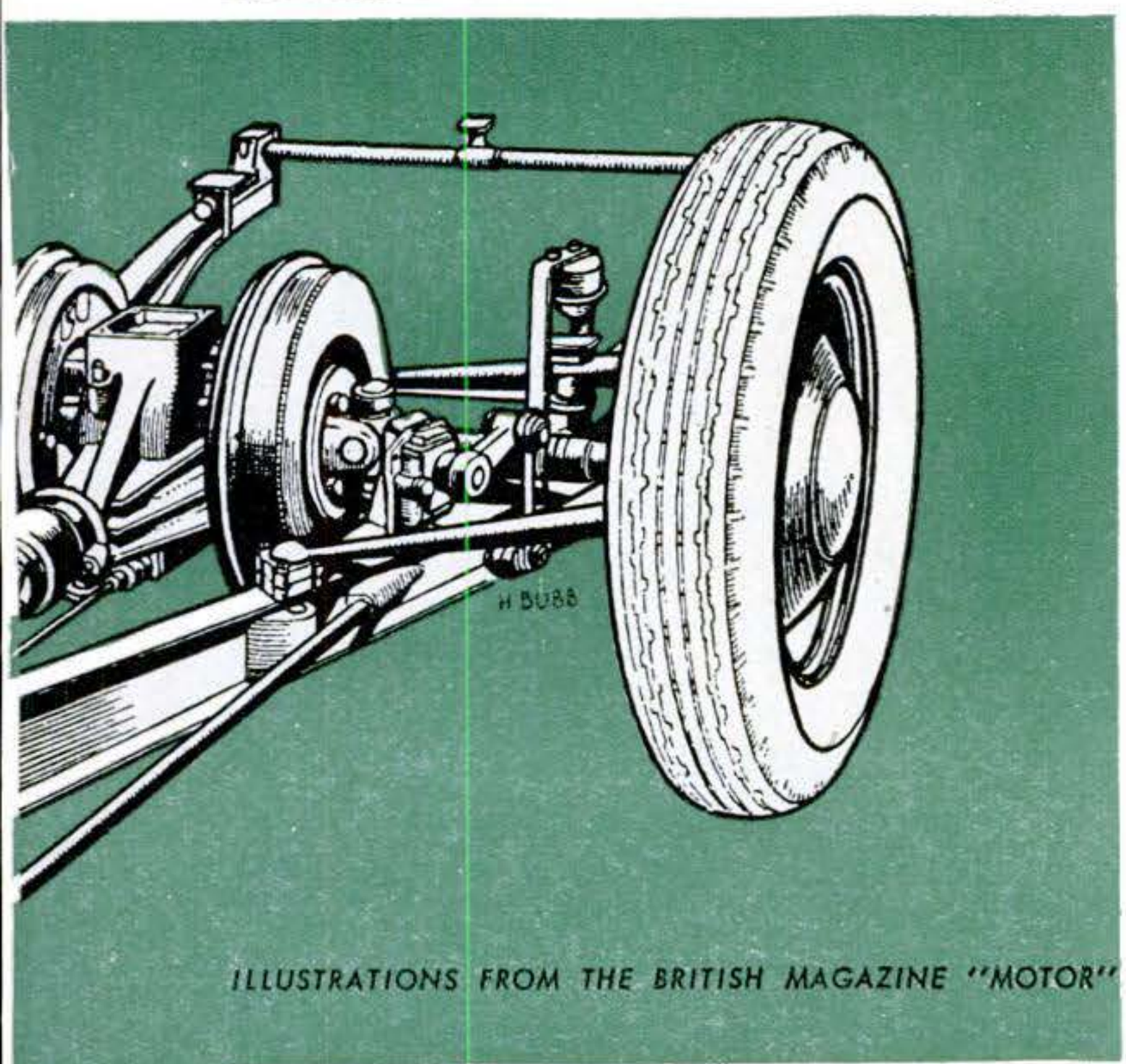
This is the chassis of the Lagonda, a medium-size car of high performance now being manufactured in England. It has independent suspension throughout, with coil springs in front and torsion bars at the back, the latter mounted inside and parallel to the rear part of the X frame. Inboard brake drums at the rear reduce unsprung weight, the drive being continued to each wheel by two universal joints and shafts splined to accommodate the change in tread that occurs when the wheels rise and fall.

Copyrighted material

British Cars—Mechanical Marvels

By R. P. STEVENSON

ENGLAND'S auto manufacturers are beginning to make up the time they lost during the war. Because the American motor industry was able to continue improvement of its product for two years after England shifted to a war basis in 1939, the first British postwar cars appeared quite out of date in comparison with ours when manufacturers in both countries returned to peacetime production. But now the British are producing some impressive new models, and it may not be long before they again will be showing us a trick or two in design, advanced engineering, and gadgetry—as they frequently have in the past.

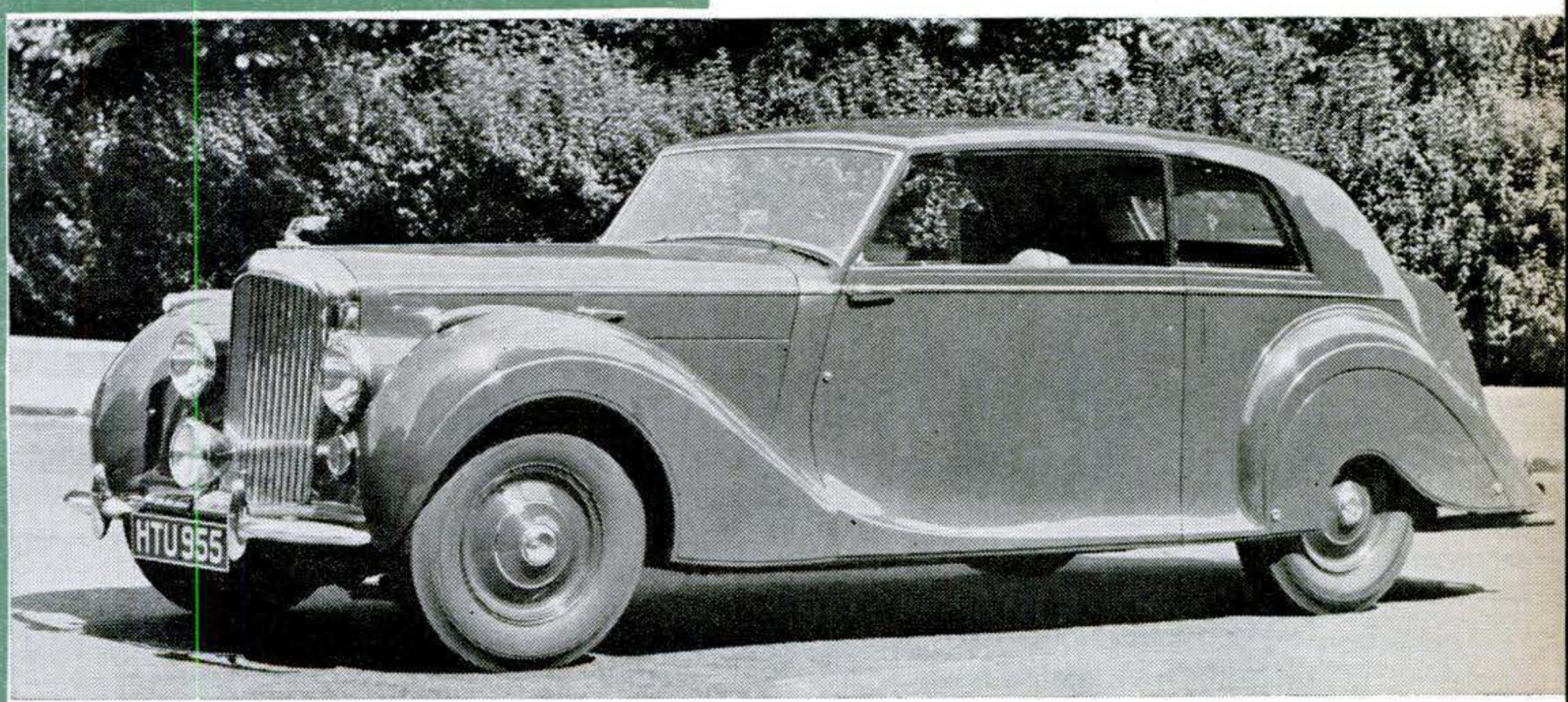


ILLUSTRATIONS FROM THE BRITISH MAGAZINE "MOTOR"

Indicative of British advances are the 1947 Invicta Black Prince and the new Lagonda. Roughly comparable to American light cars in size and power, these have six-cylinder twin overhead-camshaft engines and independent suspension of all four wheels. The Black Prince also boasts an automatic transmission. Both are strictly luxury products, the Invicta selling for about $12,000, tax included, and the Lagonda for around $7,000.

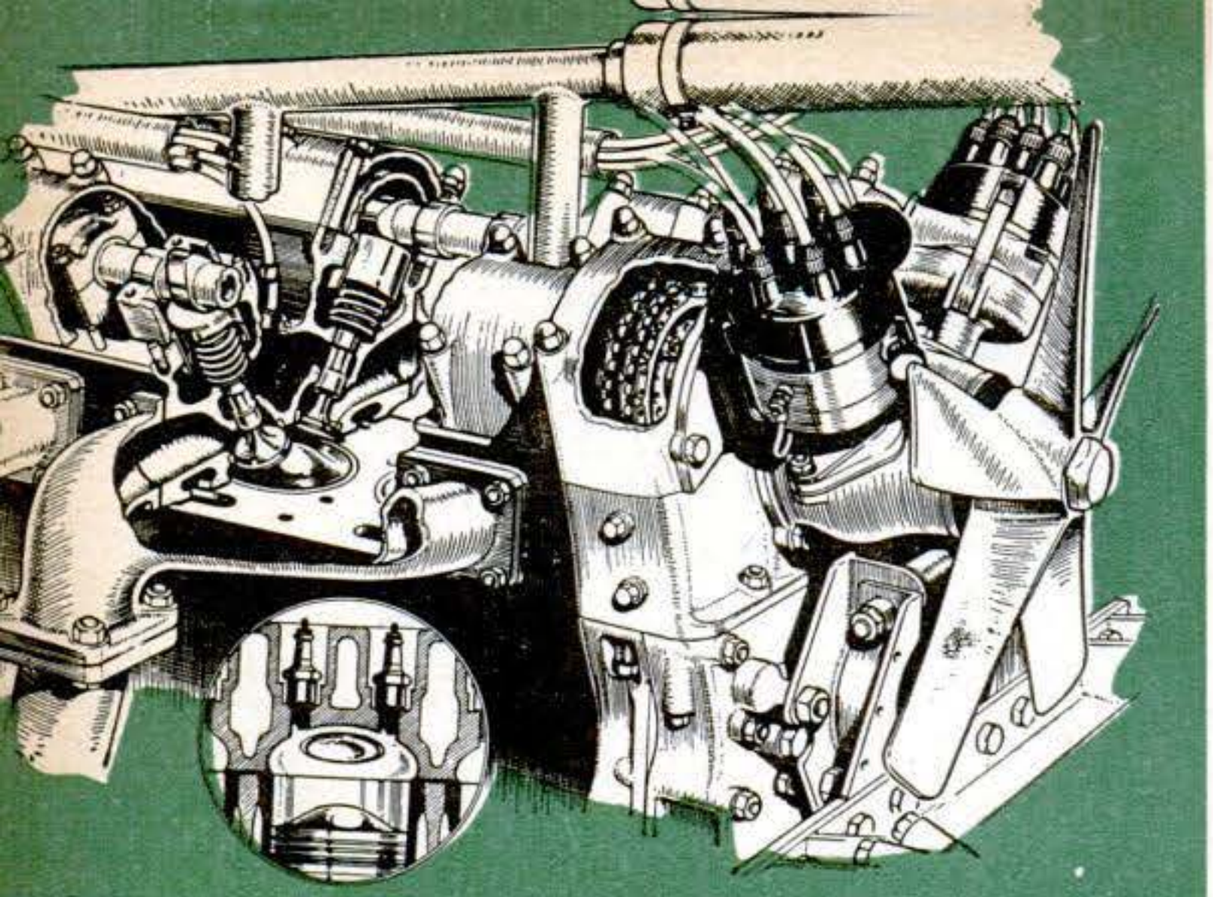
A third interesting new car is the Jowett Javelin. Selling for less than $2,000, it falls into the class of small cars that comprise the bulk of British production, its wheelbase being 102″, tread 51″, overall length 164″, and overall width 61″. But despite this small size, a wide streamlined body accommodates five persons comfortably—and six on occasion. Powered by a four-cylinder horizontally opposed engine that develops about 50 hp., the Jowett has a maximum speed somewhere around 80 m.p.h.

Owning any car in England is a costly proposition. Hand-production methods help keep basic prices high, and to these an own-

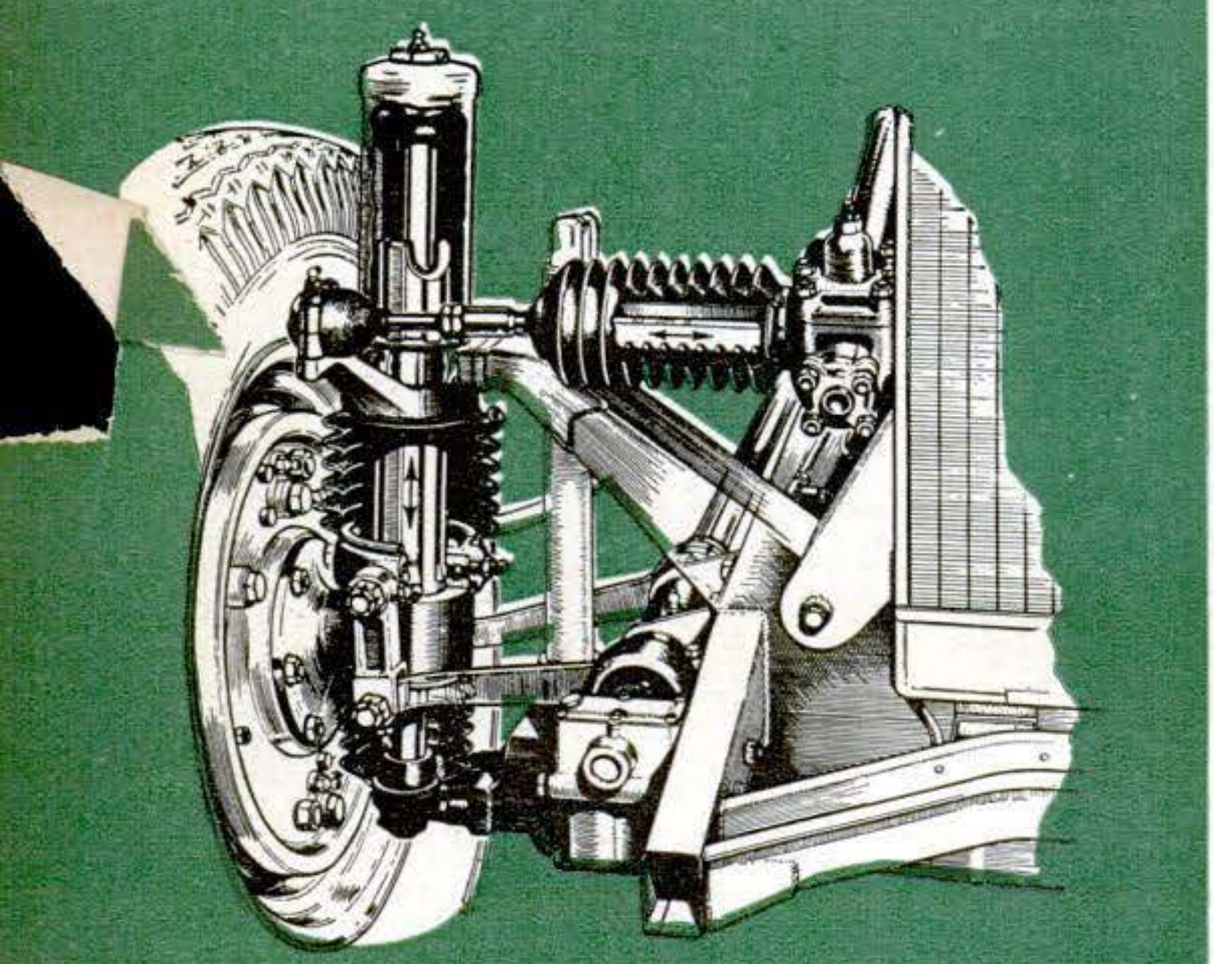


One of Britain's highest priced cars, this Bentley Mark VI sedan sells for about $17,500, including tax.

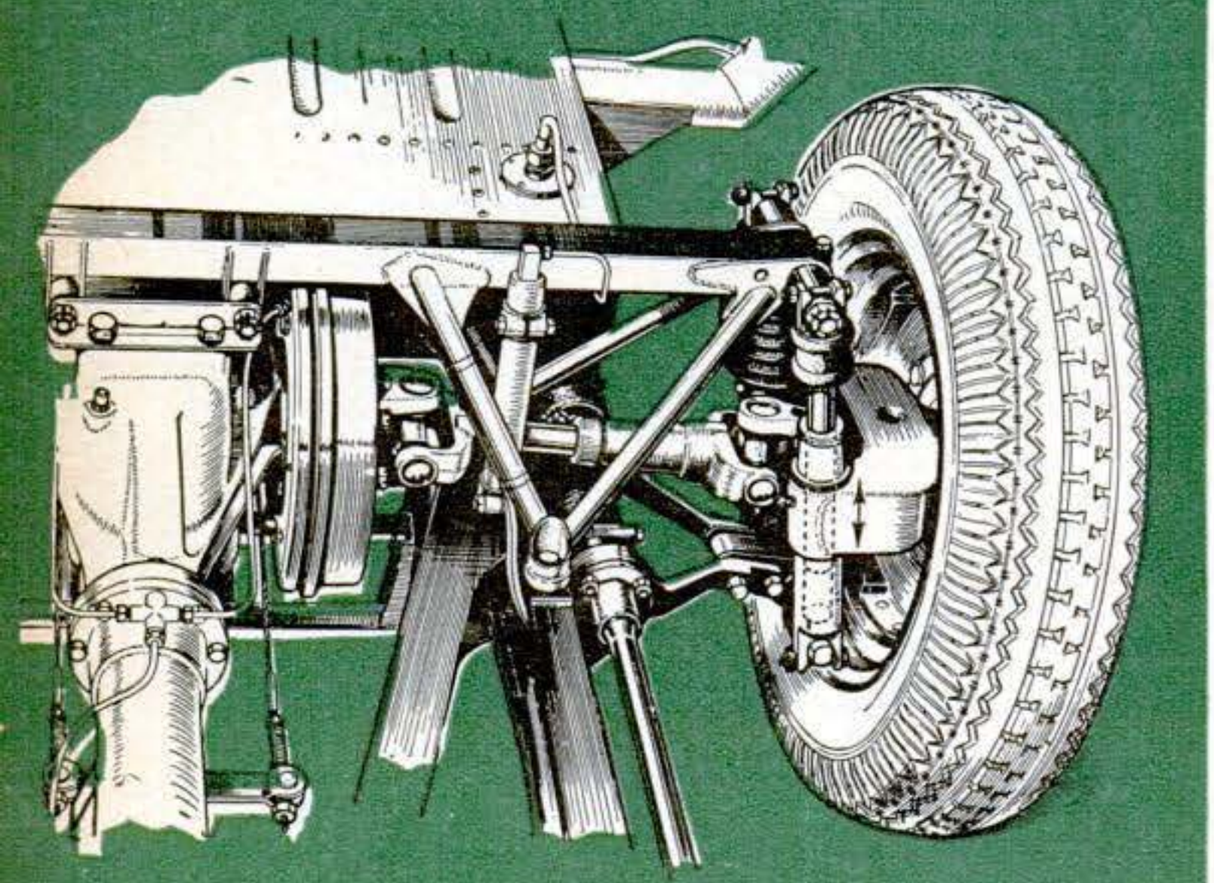
Copyrighted material



A six-cylinder overhead-camshaft engine powers the Invicta Black Prince. Twin timing chains from the nose of the crankshaft drive the two camshafts. Each cylinder has two spark plugs.



Independent front springing on the Invicta is provided by a torsion bar linked to a kingpin that slides on a vertical pillar. The torsion bar lies just outside the side frame member.



Transverse wishbones and telescopic members are combined in the independent rear suspension. The brakes are mounted on the differential assembly.

er must add a heavy purchase tax and annual taxes of more than $4 per horsepower. The least expensive car by far is a British-made Ford, the four-cylinder Anglia model that develops only about 30 brake horsepower and sells for nearly $1,200. For the medium size and larger British cars, the range shoots sharply upward. Priced at $12,000, the new Invicta Black Prince ranks below only the Bentley models, ranging between $13,000 and $18,000, and the Rolls-Royce, which costs between $17,000 and $19,000, depending on the model.

The Rolls-Royce, long a symbol of luxury, is advertised as "the best car in the world." This may not be overstatement, for this car and the almost equally famous Bentley and Daimler are products of the highest type of workmanship and skill. In the Rolls-Royce and Bentley, both of which have chromium-plated cylinders, the objective is a minimum life of 100,000 miles for all engine components.

Because of the production cost, the taxes, and the fact that the general purchasing power is low, less than 8 percent of the cars produced in England equal the popular American car in size, and three-fourths of the entire output have four-cylinder engines that develop less than 48 brake horsepower. Most of the four-cylinder engines are of the overhead valve type. In general, British engines develop relatively high horsepower for their size, and are designed to run at higher speeds than American engines.

Since gasoline is costly and still rationed, the Englishman naturally is concerned with getting the highest possible mileage. Consequently, the manufacturers of small British cars are constantly seeking technical improvements that will lift the miles-per-gallon figure to the highest possible point. Many of the small cars give as much as 30 and 40 miles to the gallon.

Most British cars still look a great deal like the American product of the middle Thirties, but there are indications that streamlining soon will take hold. It probably will be based largely on aerodynamic principles and not just appearance alone. The new Jowett has a decidedly American appearance, while both this car and the Healey give consideration to the problem of better forward visibility by using hoods that slope downward toward the front.

British transmissions generally provide four forward speeds. Single dry-plate clutches are almost universal except for the

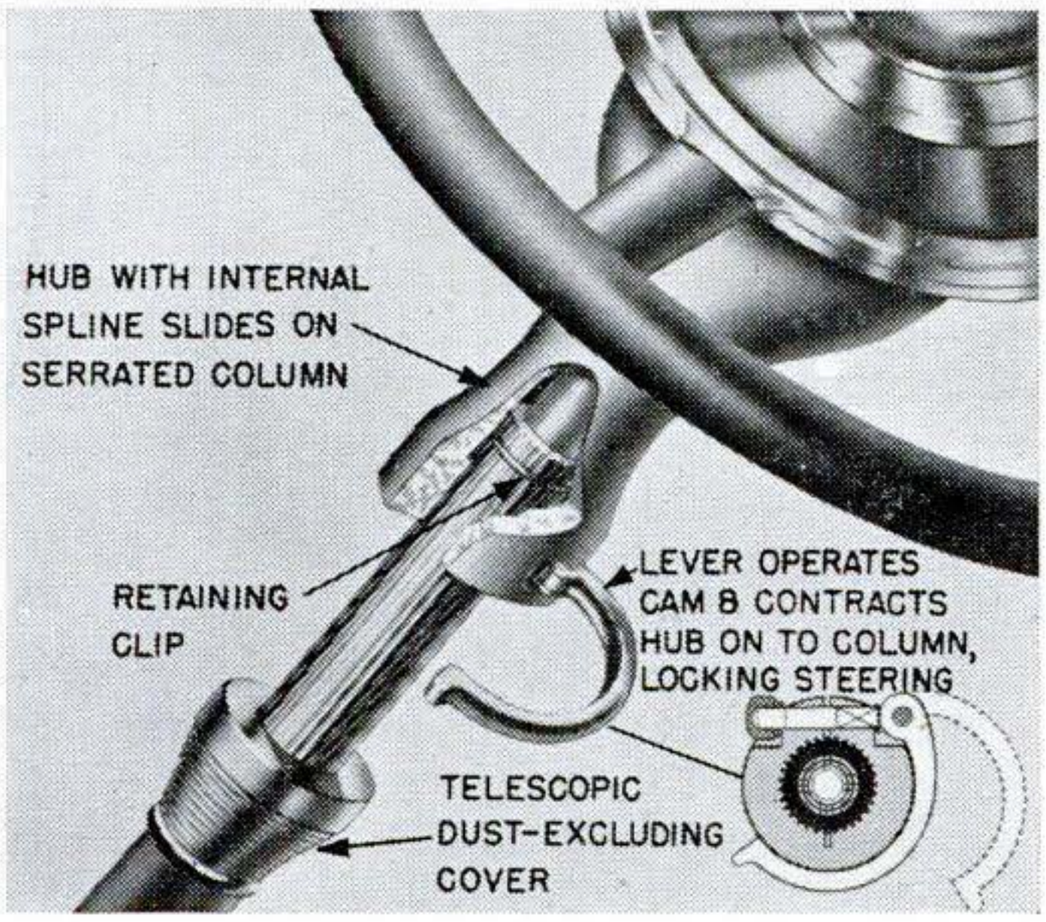
Copyrighted material

famous Daimler fluid flywheel (also now found in the Lanchester and Armstrong Siddeley) and the automatic transmission this year in the Invicta Black Prince. Most British cars still retain a floor gearshift lever, but there is a trend toward locating it on the steering column, Standard having moved the lever to that position on its 1946 Triumph 1800 and Jowett locating it there this year. With an automatic transmission, this year's Invicta, of course, dispenses with both gear lever and clutch pedal.

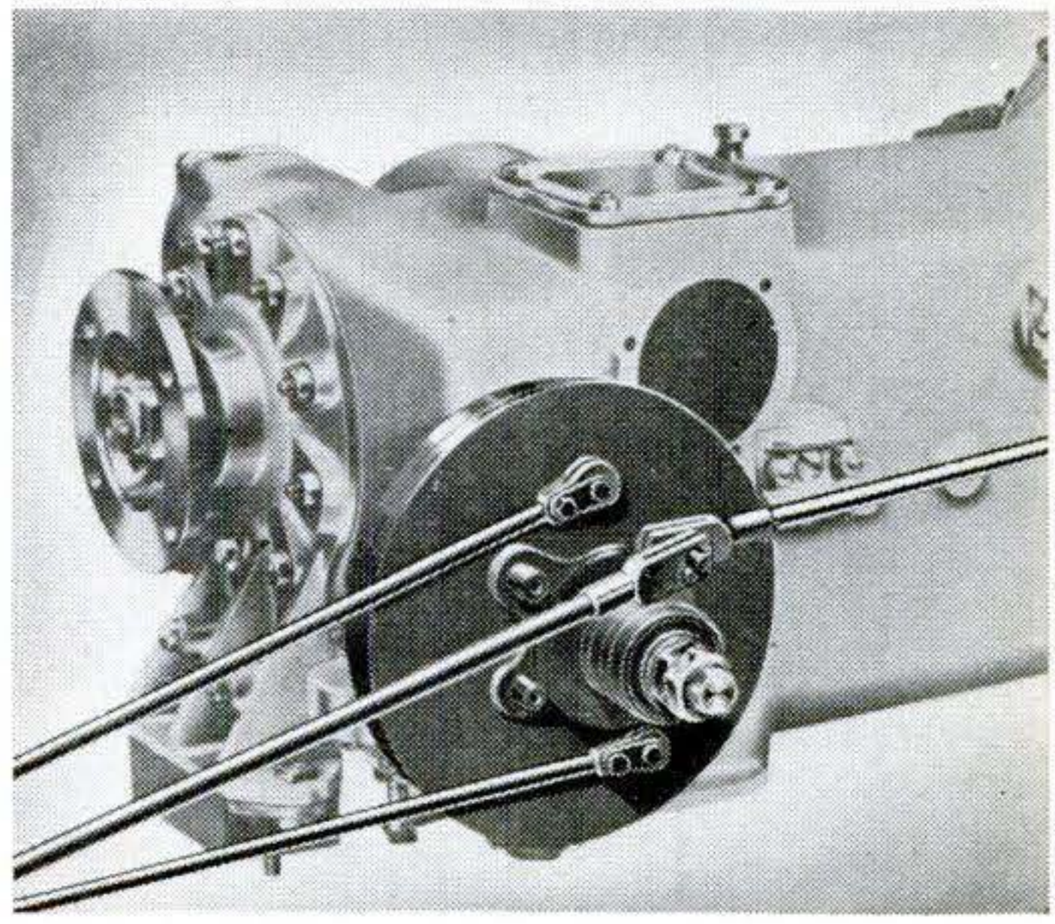
Automatic and semiautomatic transmissions now in use in the United States owe a big debt to the Daimler fluid flywheel. This was employed in Britain for several years before a fluid or hydraulic drive appeared in the United States.

Now the British have taken what eventually may prove to be another forward step. Instead of an automatic transmission of the American type, the Invicta designer has used a hydraulic torque converter. (Ordinary torque converters, incidentally, are found in many American buses.) Basically a two-stage oil-driven rotor with free-wheeling in the upper stage, the hydraulic torque converter provides a transmission combining the functions of an hydraulic coupling and infinitely variable gear between a top ratio of 4.27 to 1 and a bottom of approximately 15 to 1. For reversing, an epicyclic gear is lo-

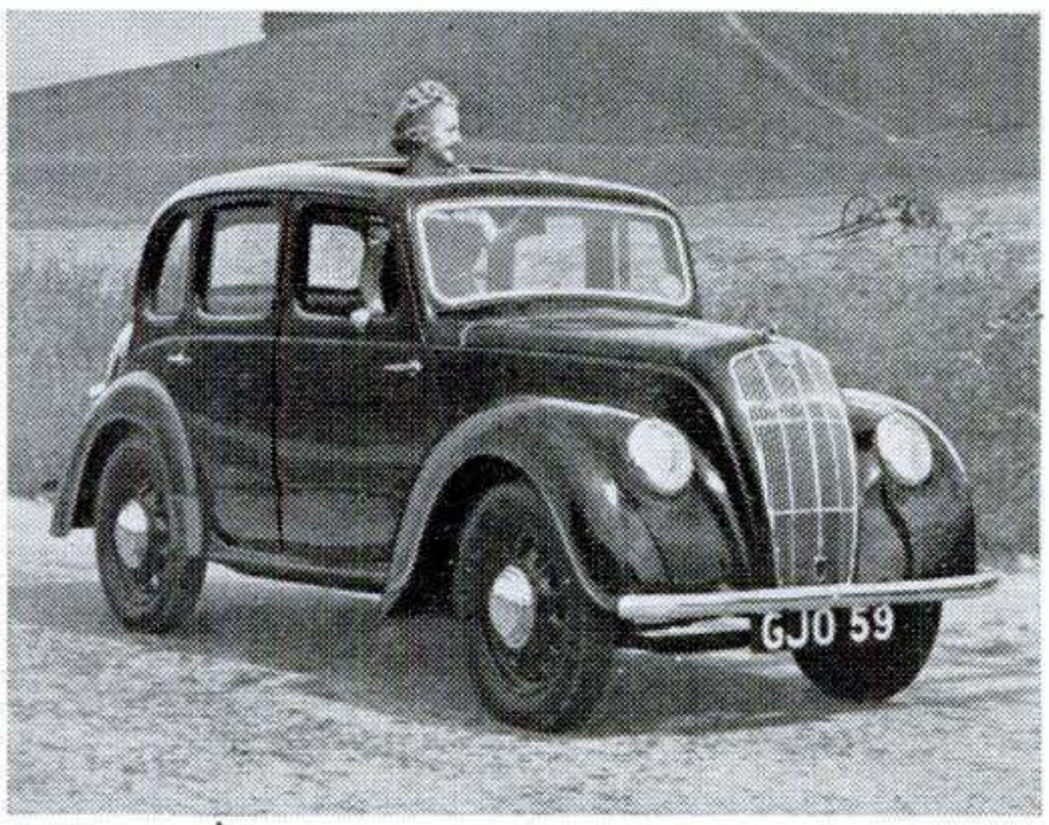
GADGETS MAKE LIFE EASIER FOR THE ENGLISH MOTORIST



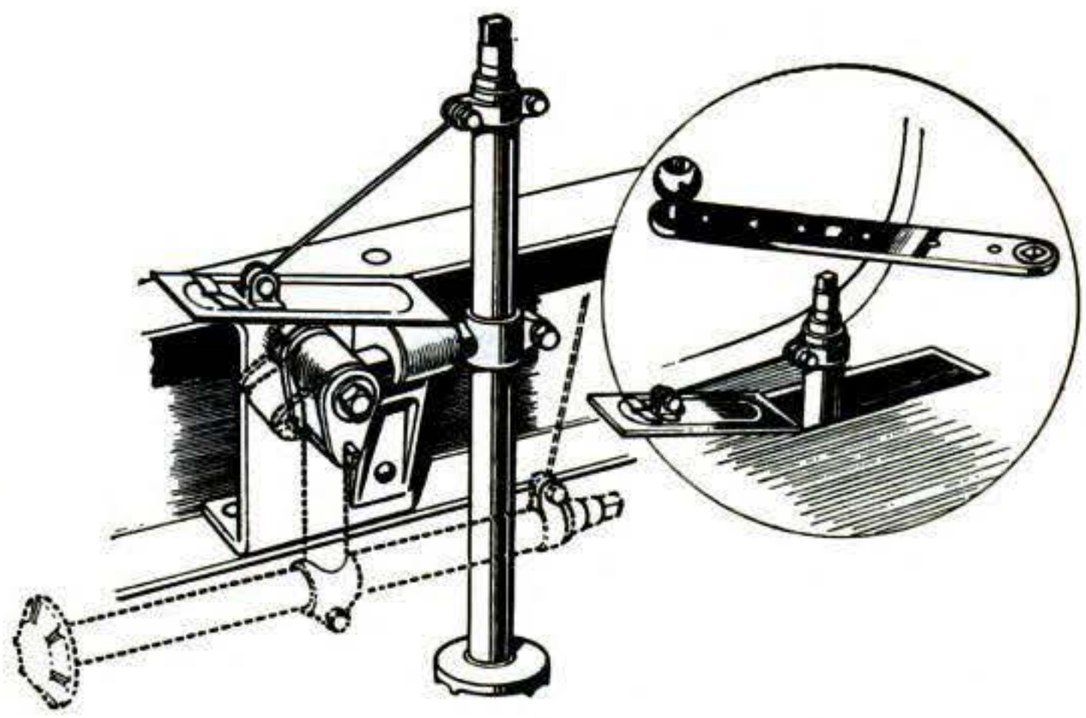
To suit drivers of different height, some British cars offer adjustable steering wheels as well as adjustable seats. The steering wheel illustrated here is manufactured by Bluemel Brothers, Ltd.



On all Rolls-Royce cars, a friction servomotor, driven off the rear of the transmission at 1/30 engine speed, boosts brake-pedal pressure. In one Daimler model, a vacuum servo does the same job.



In common with European autoists, the British like a roof that slides open to let in sunshine. This is a Morris Eight, typical of British small cars.



Most British cars have built-in jacks, some being hydraulic and some mechanical. The type above is reached and operated through a panel in the floor

Copyrighted material

cated at the rear of the torque converter. A control switch with forward, neutral, and reverse positions is placed on the instrument panel.

In operation, the Invicta transmission shifts effortlessly through all ratios like the American Hydramatic, with the driver needing only to accelerate or decelerate as the occasion requires. With the hydraulic torque converter, slip loss is high in the lower ratios, but the loss gradually descends with increasing speed under direct drive conditions. In the first tests, the Invicta reached a speed of about 75 m.p.h. with ease.

Equipped with a centrifugal automatic clutch and four-speed transmission, the new Lagonda enables the driver to shift either with or without using the clutch, the change being made with a small ball-and-socket gear lever projecting from the instrument panel. To shift without the clutch, the accelerator must be manipulated to bring engine speed to the proper point. The Lagonda is capable of a speed of 90 m.p.h., has a cruising speed of 76, and gives over 22 miles per gallon.

It may be more than coincidence that both the Lagonda and Invicta employ six-cylinder twin overhead-camshaft engines. Of the two, the Invicta has the more unusual features. It has two spark plugs per cylinder, three main carburetors and two auxiliaries for starting, and twin exhaust manifolds. The inclined overhead valves are driven directly from the camshafts, and two timing chains from the nose of the crankshaft drive the camshafts. Camshaft whip is eliminated by supporting each shaft in 12 bearings. The Invicta engine is rated at 24.4 hp., making it approximately equal to an American car of 100 brake hp.

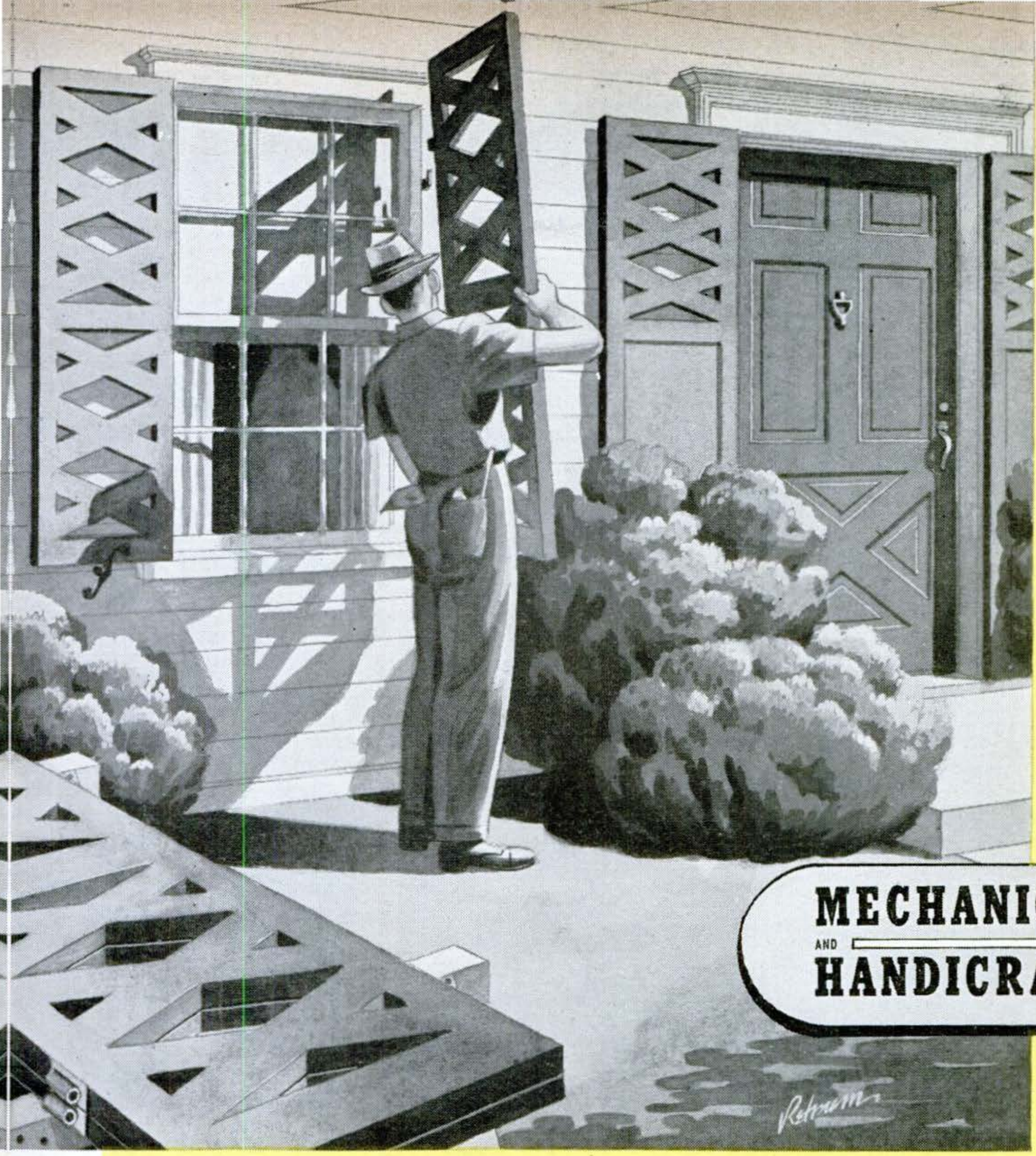
Independent suspension of all four wheels is a notable feature on both of these, new British cars. On the Invicta, the actual springs are four long torsion bars located outside the side frame members. On the Lagonda, torsion bars are used at the rear, coil springs in front. An examination of the two rear suspensions reveals an unusual feature common to both—the brake drums have been moved inward to either side of the differential housing. This reduces unsprung weight and eliminates the need for flexible brake linkages. Since the rear wheels are independently sprung, the differential housing can be attached solidly to the frame. Consequently, the drive shaft does not rise and fall.

Both cars also depart from the general custom of recent years in the matter of steering. In each case, the transverse movement is obtained with a helical rack-and-pinion mechanism. One of the original methods of steering in the early days of the automobiles, this has been regaining considerable favor in England in recent years.

While many American manufacturers rely on steel bodies to help give their cars overall strength, the Invicta and Lagonda designers both put their faith in a rugged cruciform frame on which a stiffening flat floor is mounted. On this floor is fitted a light body that has as its only purpose the protection of the passengers. END

In England, Fords are by far the least expensive cars. This is the Prefect model, selling for about $1,400.

Copyrighted material



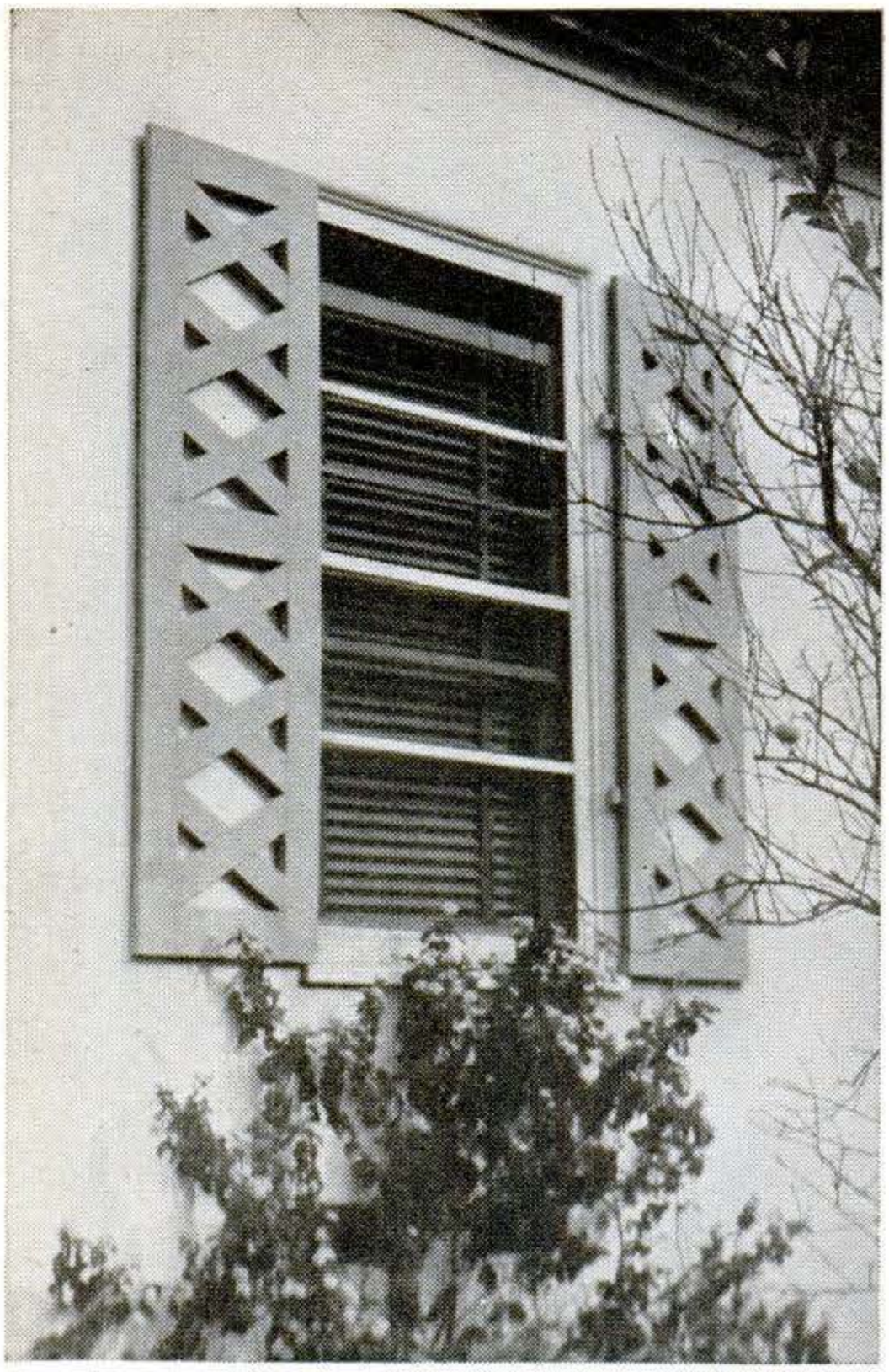
MECHANICS AND HANDICRAFT

- Distinctive Window Shutters
- Jet-Propelled Model Racer
- Fisherman's Electric Outboard
- Packaged Radio Power
- Vacuum Cleaner as a Power Tool

Copyrighted material

Shutters Add

By Hi Sibley



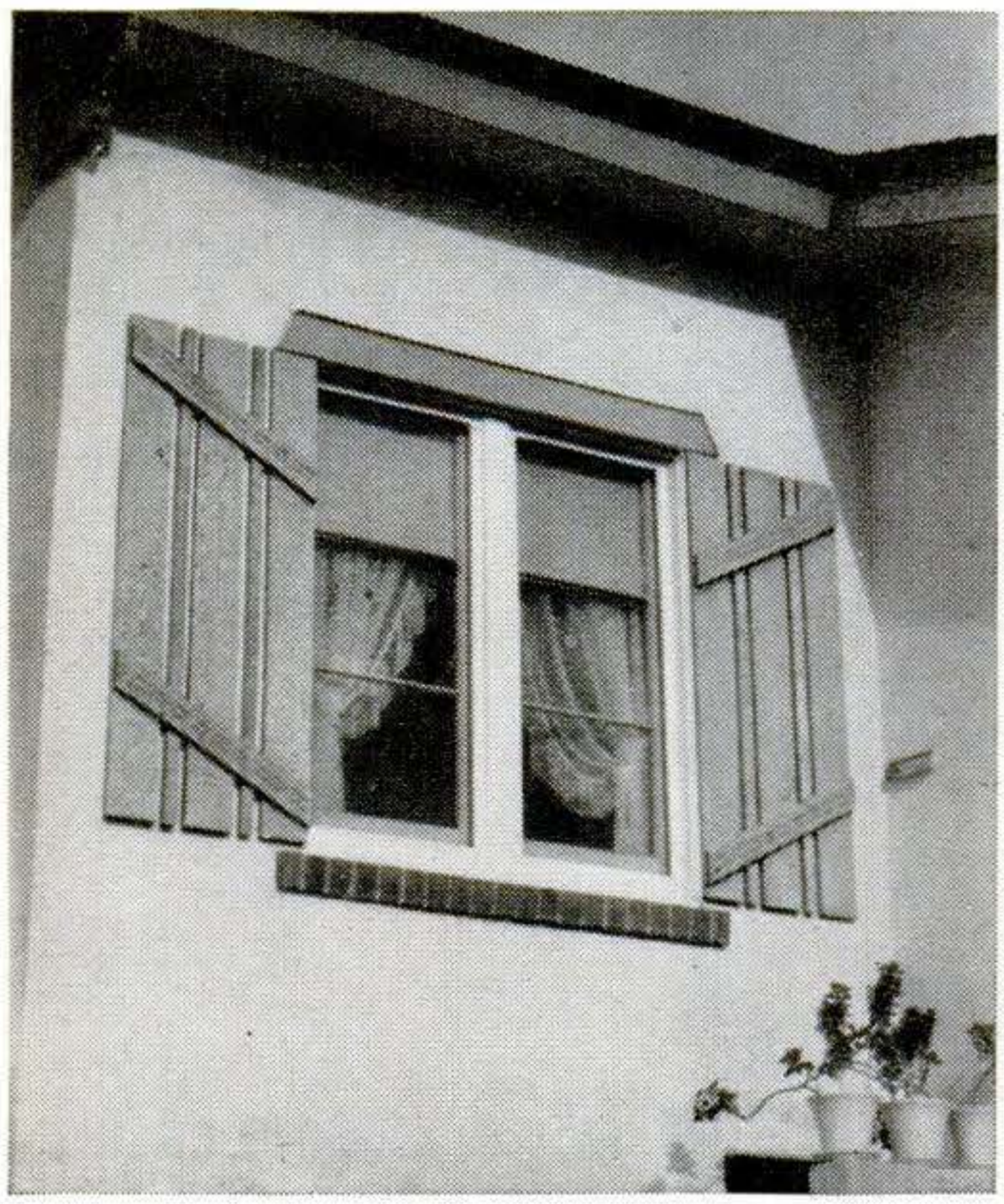
The crossed-rail shutter as used here effectively sets off the Venetian blinds within. In color it complements rather than contrasts with the wall.

WINDOWS are the eyes through which your house looks out on the world; what the world sees when it looks back depends upon your decorative skill and ingenuity. For purposes of exterior decoration, shutters have few rivals. They break up blank wall spaces and lend distinction and personality to the house. Half a dozen simple designs are shown on these pages, and any of them can be readily built in the home workshop.

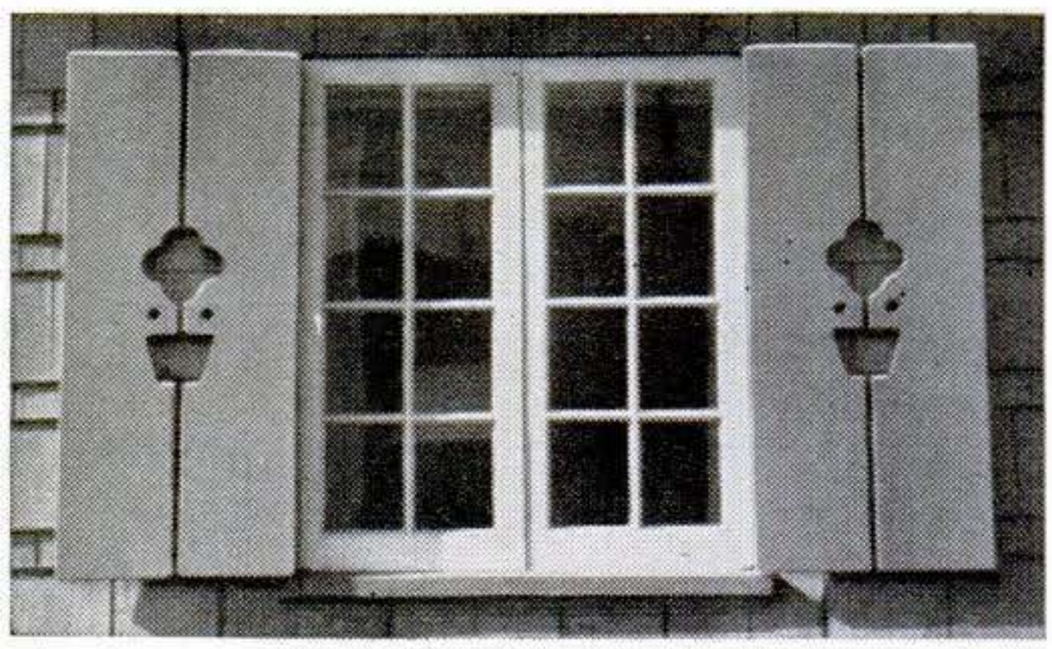
The picture at the upper left shows a shutter made of crossed rails bound by a frame of ⅞″ by 1½″ stock mortised and tenoned at the corners. Short tenons are used on the center rails to keep them from going through the side members. The crossed rails are put together as shown in the sketch on the facing page.

A familiar slat type of shutter is shown in the same drawing and in the photo that adjoins it. The slats are glued into 45-deg. grooves and covered with strips. Cross-pieces above and below the center panel are tenoned into the stiles. A sheet of waterproof plywood or other thin stock is then set into the rectangle thus formed to provide a backing for curved corner pieces and a jigsawed rosette.

The remaining shutter designs pictured here are all variations of the slat-and-batten arrangement. Two or more boards of uniform or alternating widths are joined by battens either in front or in back to produce these varied effects.



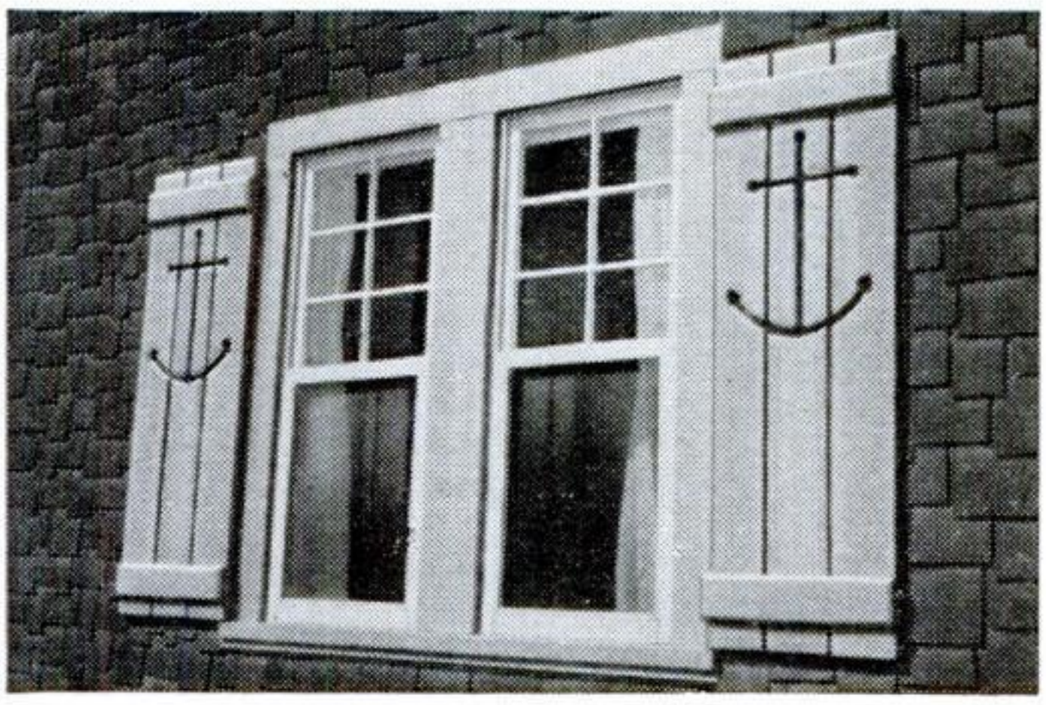
Three wide and two narrow boards are joined by a pair of slanting battens to produce this shutter suitable for almost any light-walled cottage.



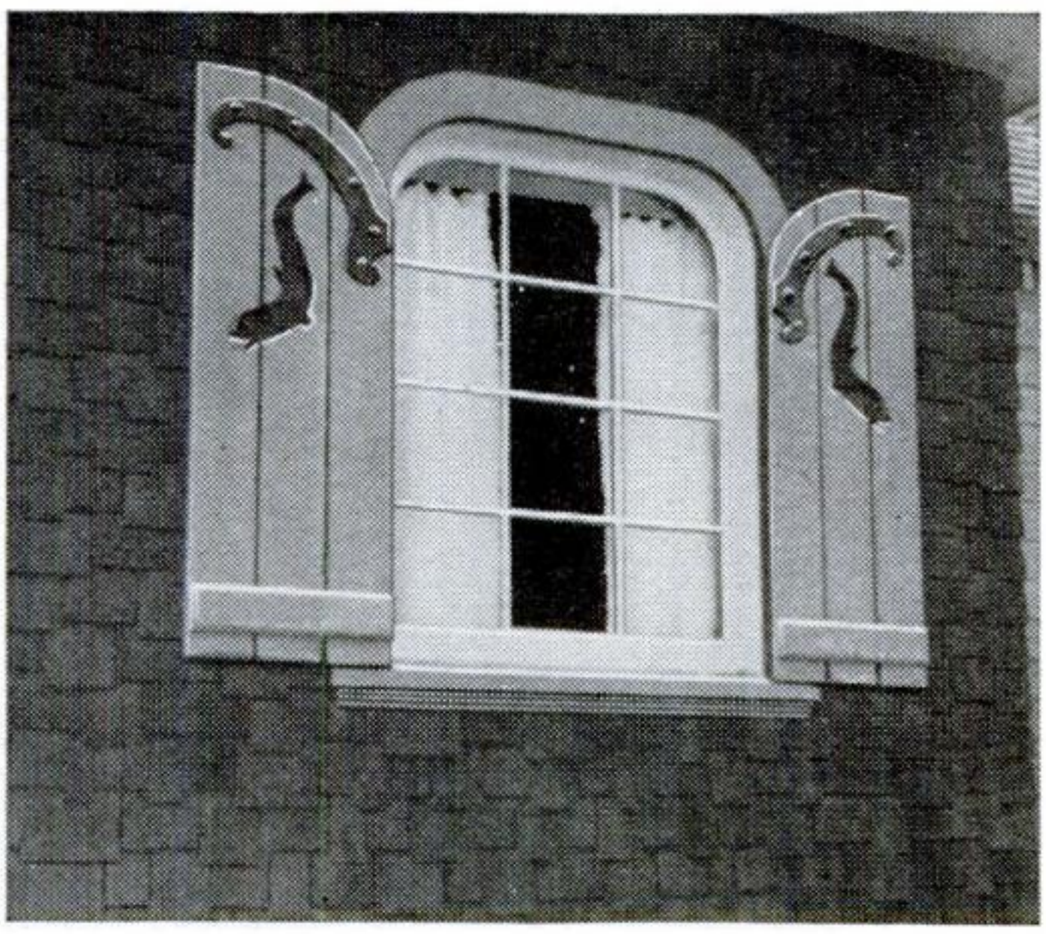
These shutters are battened from behind, one strip being placed across the top and another across the bottom. The pattern is given on squares at right.

Copyrighted material

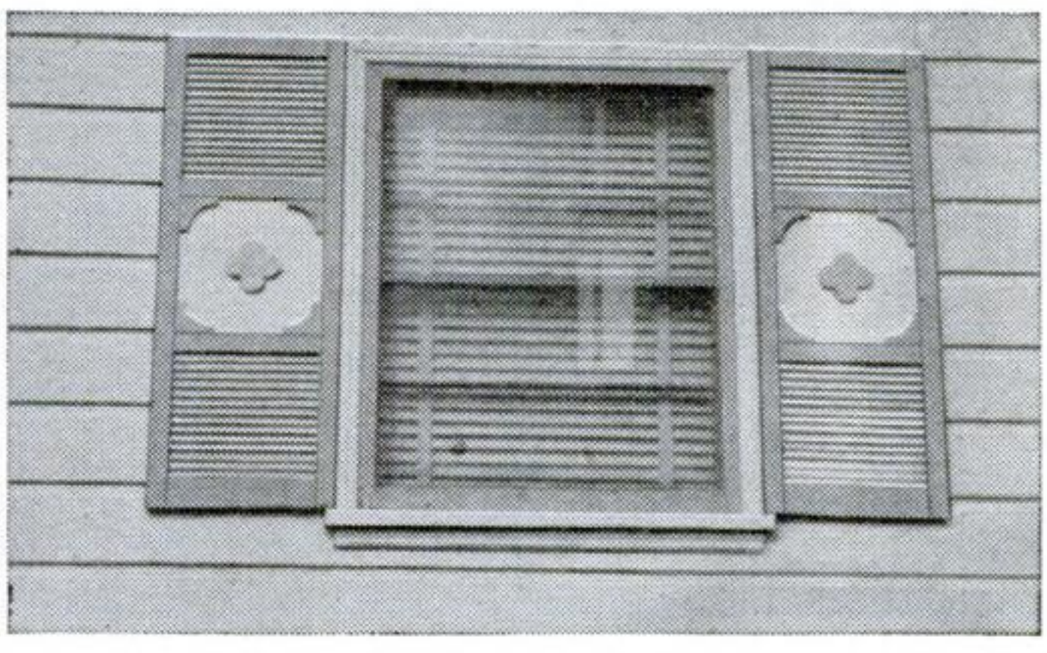
Personality to Your House



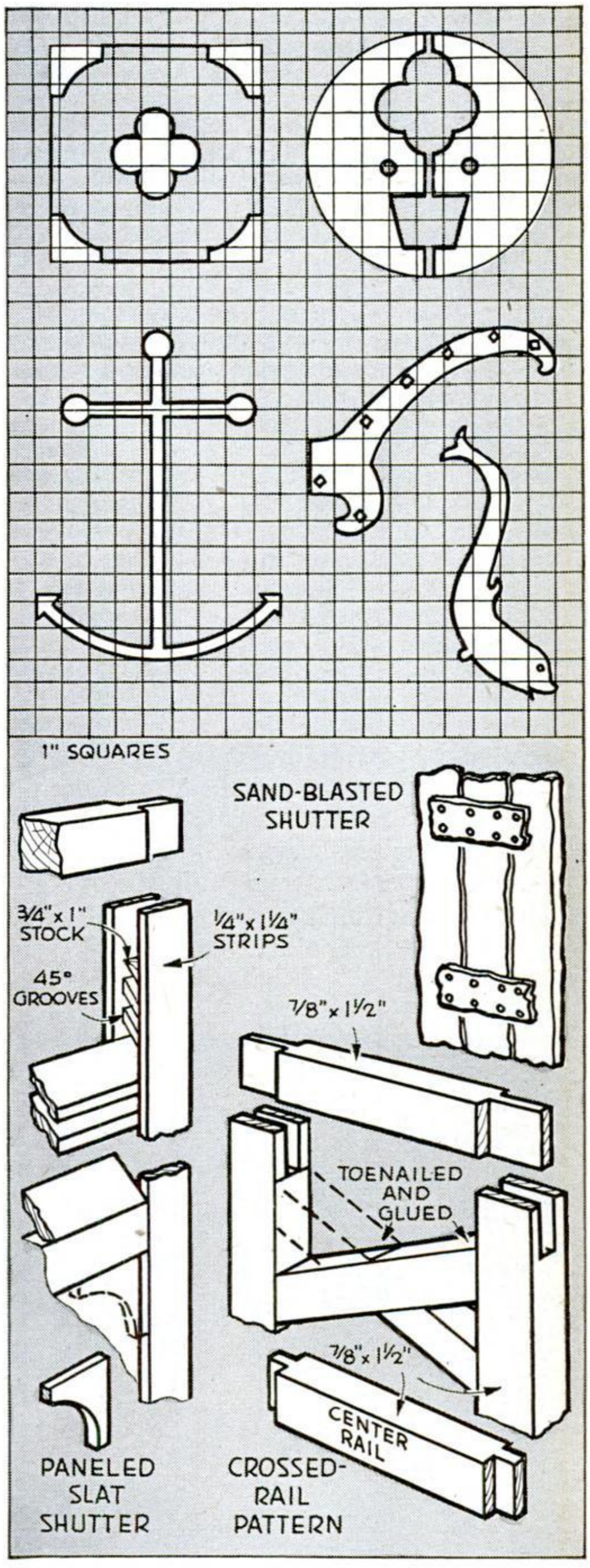
For beach homes the marine designs above and below are particularly appropriate. In the anchor above, free pieces are held by batten in back.



The dolphin is cut out of two of the three boards used in this shutter; an ornamental hinge serves as the top batten. It is fastened with lag screws.



This old-fashioned slat-type shutter is relieved by a decorative center panel. A backing of waterproof plywood is glued between the center rails.



Details of the paneled-slat and cross-rail types are shown above. A weathered effect may be obtained by sand-blasting or partly charring with a torch.

Copyrighted material

Whizzing Racer Is Jet Propelled

By Joe Bell, Jr.

WHEN you release the gas from this slick little 8-oz. racing car, step back. It should be speeding down the straightaway at 50 m. p. h. within 100′. If you puncture the jet exhaust properly, it will hold that speed for another 100′ or more.

The fast little three-wheel racer is made from standard model-plane materials that can be obtained at any model-supply shop. It is propelled by the discharge from a carbon dioxide cartridge of the kind used to charge home soda bottles. Held to its course by a stretched guide wire, it will run up to 240′ on a single charge. The futuristic-looking model is shown in full color on page 128.

To form the body cover, soak a 1/16″ by 4½″ by 6½″ piece of soft sheet balsa in hot water until it is pliable, bend it around a 1¼″ diameter dowel or broom handle, wrap loosely with gauze, and let stand until thoroughly dry. Cut the bulkheads *A*, *B*, and *C* from ⅛″ medium balsa sheet, notching *A* for wheel clearance.

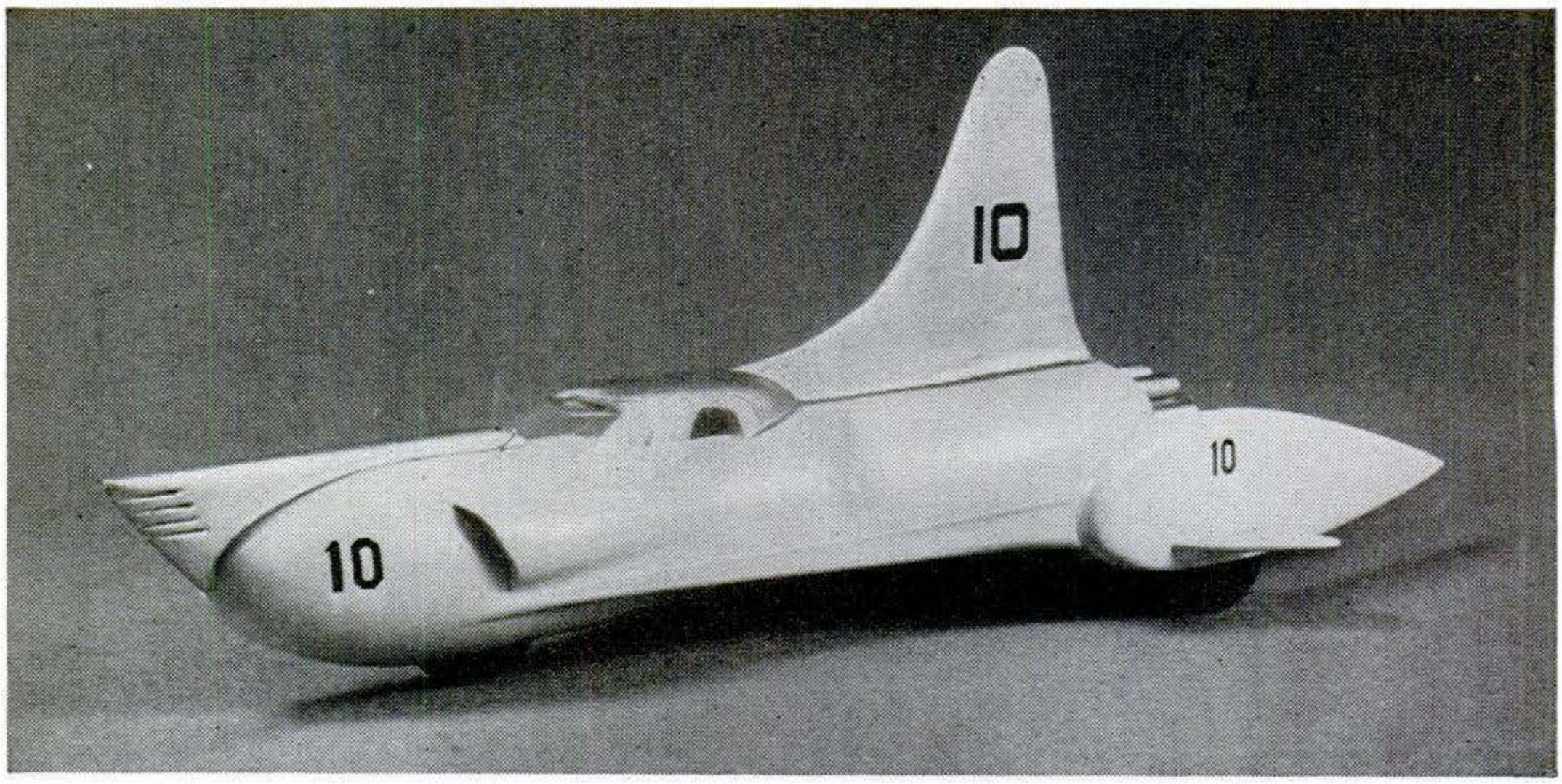
The laminated nose is made of seven pieces of ¼″ soft balsa. While the block is still in its rough shape, cut out clearance for the front wheel. The tail block is made from three pieces of ¼″ soft balsa, one piece being the same size as the bulkheads and the others ⅛″ larger in diameter. Cut a ⅞″ hole in each. Glue the three together and leave in rough form.

Make the jet chamber by soaking a piece of 1/16″ sheet balsa in hot water and wrapping it loosely around a soda-bottle cartridge. Wrap with gauze until dry. Glue up the seam, cement a plug of ⅛″ hard balsa sheet in one end, and glue the chamber into the hole in the tail block. Cartridges should fit freely so they can be changed readily.

Wheels are made of 1/16″ three-ply plywood. Cut three disks 1″ in diameter and six ½″ in diameter. Sand all to perfect circles and glue ½″ disks on both sides of the 1″ disks as hubs. Drill the centers to turn freely on the wire axles.

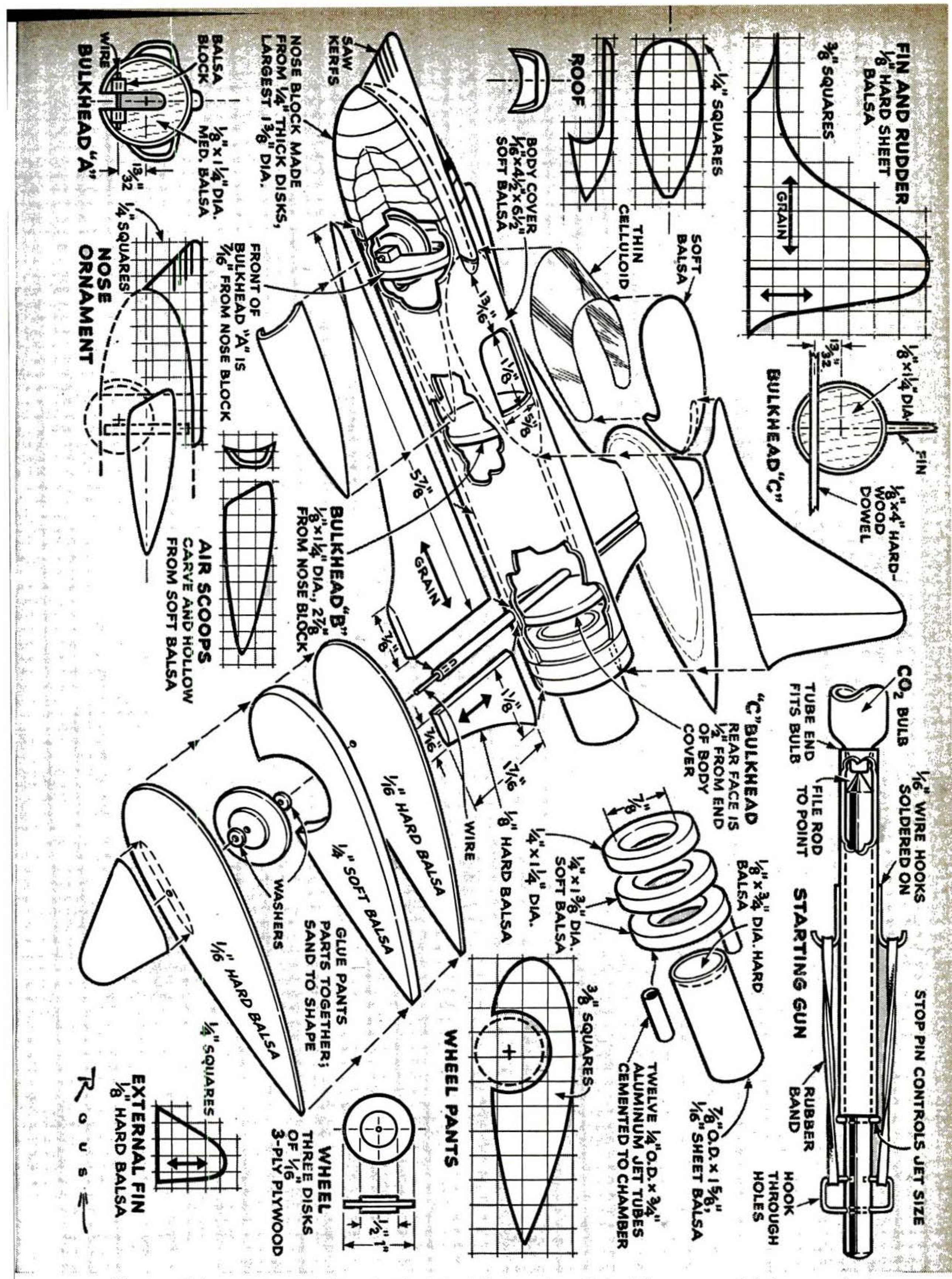
Assemble one wheel on bulkhead *A* with washers on both sides and glue securely. Then glue the bulkheads and the nose and tail blocks into the formed body cover, making sure that the clearance slot provides completely free movement for the front wheel. Sand the nose and tail to shape.

Drill the ends of a 4″ length of ⅛″ hardwood dowel for a press fit for the axle wire, and drill through the body just ahead of bulkhead *C* to take the dowel. Insert and



As speedy as it looks, this little balsa racer will do up to 50 m. p. h. for a distance of 200′ or more.

Copyrighted material



All parts of the car are made from standard stock that can be obtained from any model-plane supply shop.

Copyrighted material

glue in this part of the axle, checking carefully for true alignment.

Cut the cockpit opening in the top of the body. Carve and sand a ¾″ by 1″ by 2½″ block of soft balsa to shape for the roof, glue in place, and let dry.

The horizontal fins are cut to shape from ⅛″ hard sheet balsa, sanded, and the edges rounded. Note that the grain in the forward fins runs front and back, and that in the rear at right angles. Glue the fins in place, taking care to check alignment.

Air scoops are carved and hollowed from two ⅜″ by ¾″ by 2¾″ blocks of soft balsa, glued on the body, and sanded smooth. The wheel pants are glued up from pieces cut from ¼″ soft sheet and 1/16″ hard sheet, sanded to final shape, and glued in place with several coats of glue for added strength.

Cut the vertical fin and rudder from ⅛″ hard sheet, again noting the change in grain direction. Sand to final shape, align carefully, and glue in place.

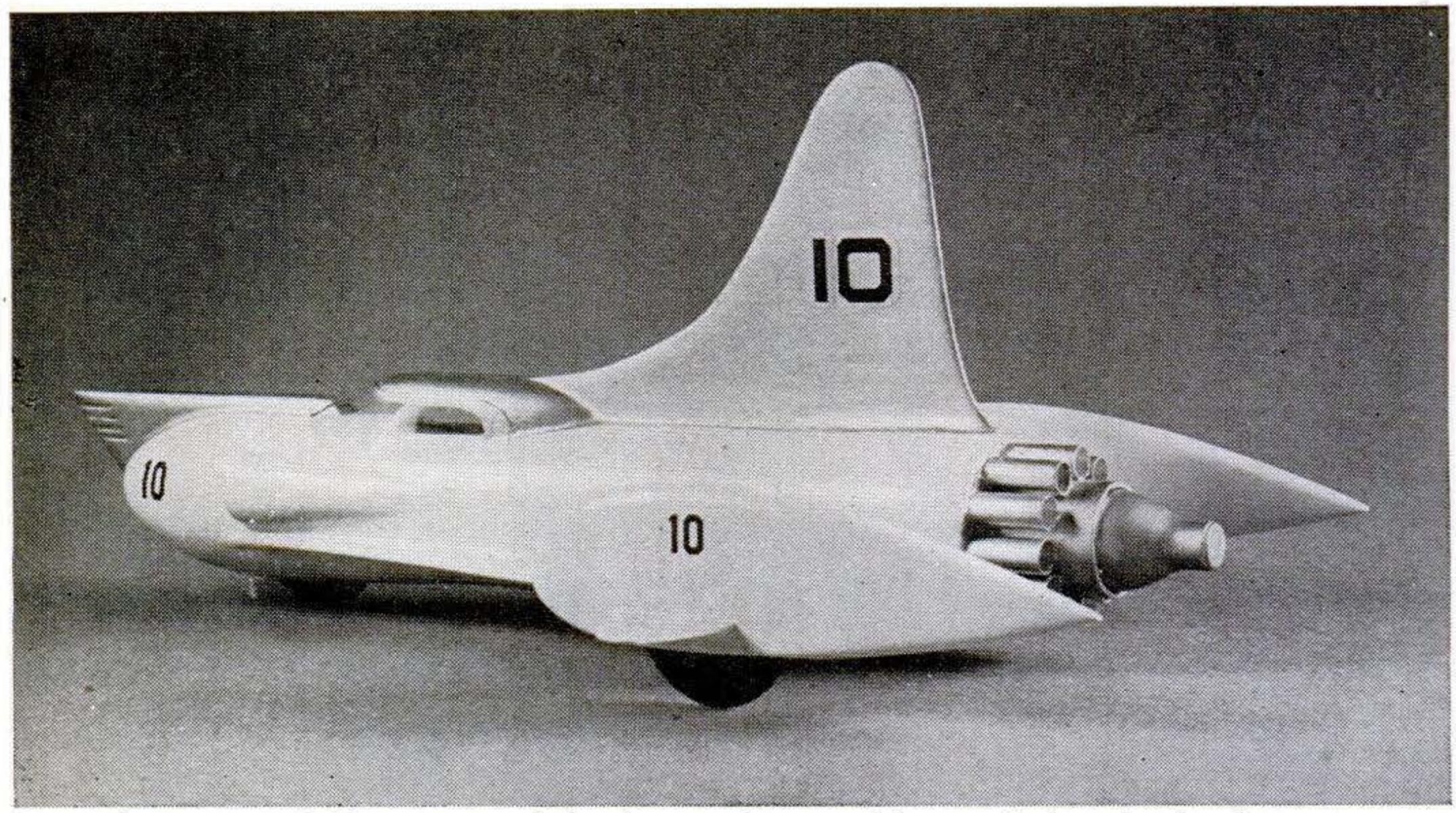
Put the wheels in the pants, push wire axles through them and washers and into the drilled holes in the dowel, and then glue and let dry. Cut the outer fins from ⅛″ sheet and glue on in good alignment.

The nose ornament is cut from ¼″ hard sheet balsa, tapered toward the front, and kerfed for appearance. Glue on and sand. Then seal all exposed surfaces with a wood filler or sanding sealer to assure a smooth finish, and paint to suit.

Jet tubes are next made of ¼″ O. D. aluminum or other tubing, or from lengths of malted-milk straws, and cemented into ¼″ holes in the tail block and to the jet chamber. The nose ornament is slotted for the windshield, and paper is fitted in until, by trial and error, a template is obtained from which the celluloid windshield is cut. It is glued in the slot and to the body and roof.

The gun is simple to make. Fit a solid rod loosely into a metal tube having an inside diameter that goes easily over the end of a carbon dioxide cartridge. Sharpen the firing end of the rod to a needle point. Solder wire hooks and a stop pin to the tube. Then fit a hooked wire into holes drilled in the butt end of the firing rod so that when the wire is pulled to either side it will expose an opening through which a rubber band can be slipped. Loop the bands over the hooks on the side of the tube.

To keep the car on its course when it is in operation, stretch a guide wire the required distance and run it through screw eyes put in at two aligned points on the car. Have a friend hold the car down with one finger, and then pull back the trigger of the starting gun, touch the firing end gently to the cartridge, and release the plunger, which should be adjusted so the needle makes the tiniest hole possible. The smaller the hole, the faster and farther the car will go. Lay a folded carpet at the end of the course as a cushion to stop the racer gently, or it may be smashed to bits on its first trial run. END



Here's the action end. The jet is a soda-bottle cartridge ringed by tiny "exhaust" tubes for appearance.

Copyrighted material

Turned Lamp Is Oil Finished

By William J. Ward, Jr.

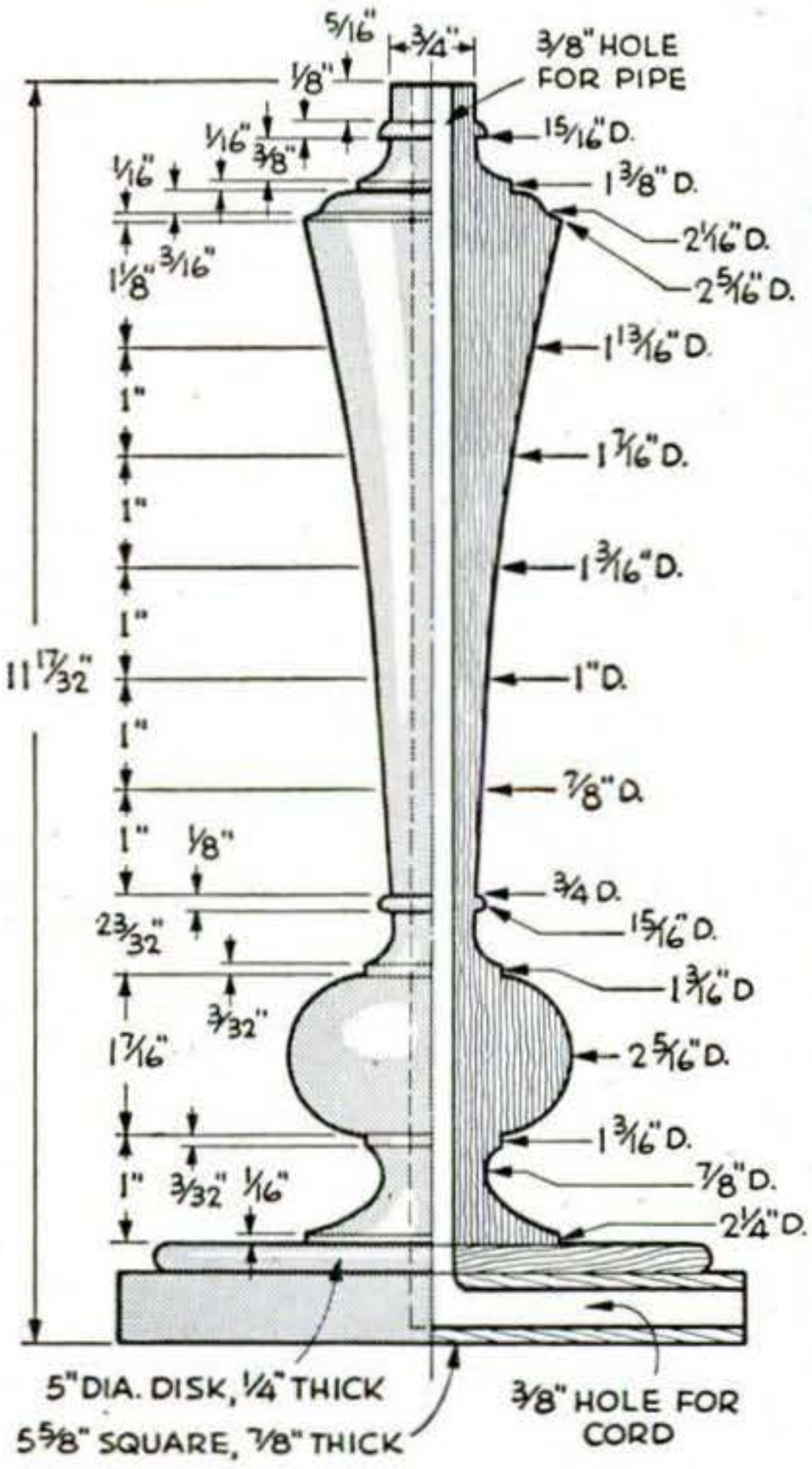
TO PRODUCE work that has the quality of mellow age while still quite new is one of the hallmarks of the master craftsman. This lamp meets that test, not only in the semblance of a patina that frequent rubbing with linseed oil gives, but also in the simple turned design. It would look at home in the company of many genuine antiques, particularly in a living room furnished in Early American style.

Except for the square plinth base topped by a round-edge disk, the lamp is an accurate copy of a ball-and-trumpet leg of a William and Mary highboy. Turn the piece from any good cabinet wood, trying the contour from time to time with a template made to the dimensions in the drawing. Bore through from both ends and screw in a ⅛″ pipe nipple at the top of the column.

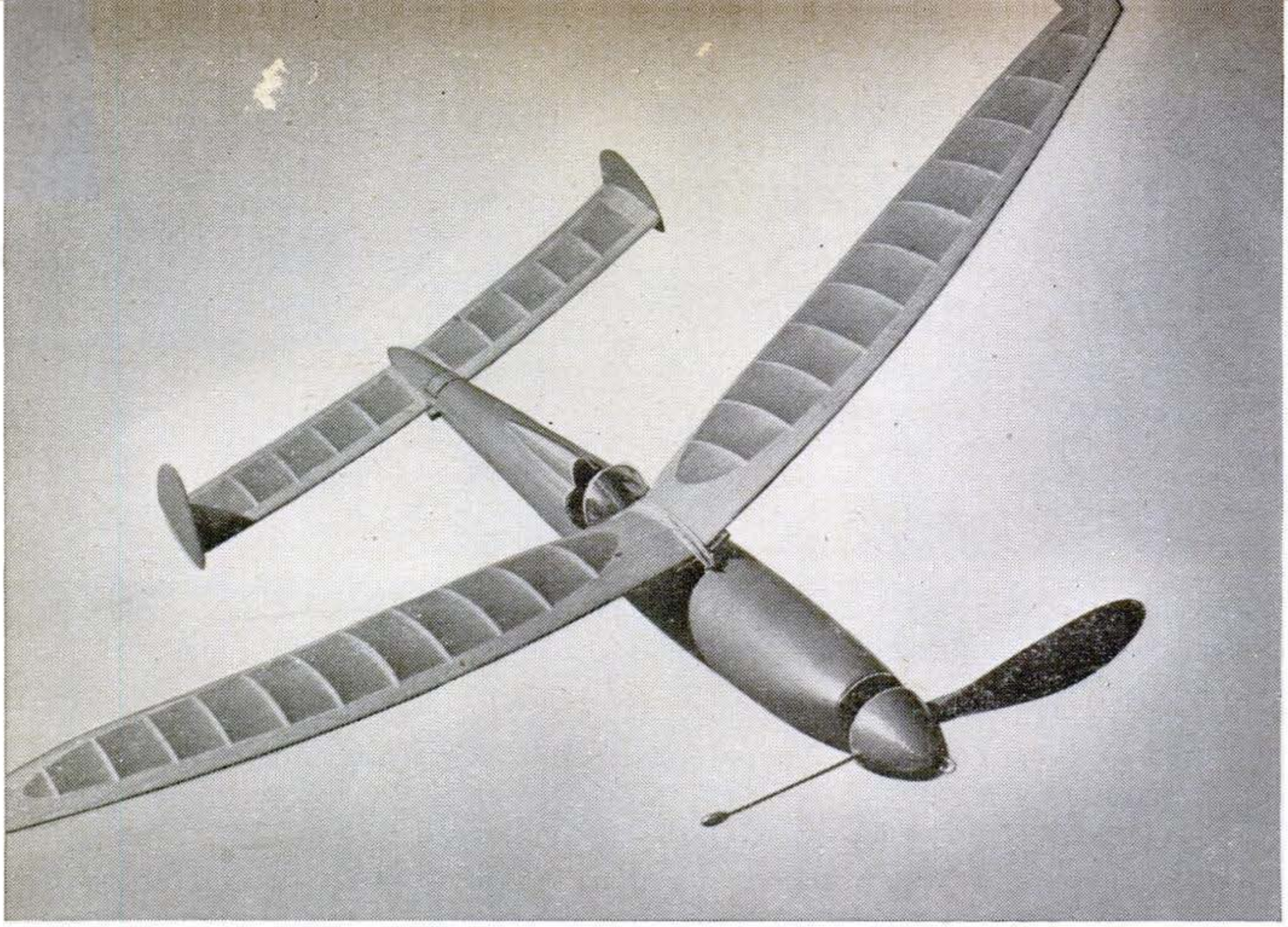
Walnut was used for the lamp shown, and it was sanded repeatedly with successively finer grades of garnet paper to 6/0. After each sanding, the piece was wiped with a damp cloth to raise the fine hair fibers in preparation for the next finer sanding. Finally double-boiled linseed oil was applied, as the old formula has it, "every day for a week, every week for a month, every month for a year"—and now every year for life.

Linseed oil will darken the wood considerably. A finish that will keep the wood light is beeswax melted in turpentine and applied hot at the consistency of thick cream. Prepare the mixture carefully in a double boiler set over a low flame, since both beeswax and turpentine are highly inflammable.

A handsome lamp can be made of mahogany, maple, or other good hardwood instead of walnut if one of these is more appropriate. Any can be finished dark with boiled linseed or blond with wax and turpentine.



Copyrighted material



Here's a rubber-powered model that will reach out not only for altitude, but for real distance as well.

The Chieftain Hits the Ceiling

By Paul Mueller

THIS rakish plane, the Chieftain, is a flying model designed for clean appearance and good flying qualities. Construction is much less complicated than it may seem. The retractable landing gear and folding propeller lessen drag when in the air. A color shot of the plane as it might look in flight is shown on page 128.

Glue up two 1″ by 2½″ by 21″ blocks of soft balsa with paper between them, and then carve the outer shape of the fuselage, turning the piece in the hands often to aid in obtaining concentricity. Then split the two halves apart and hollow out the inside with a gouge to 3/32″ thickness except at the nose. This is the hardest part of the job.

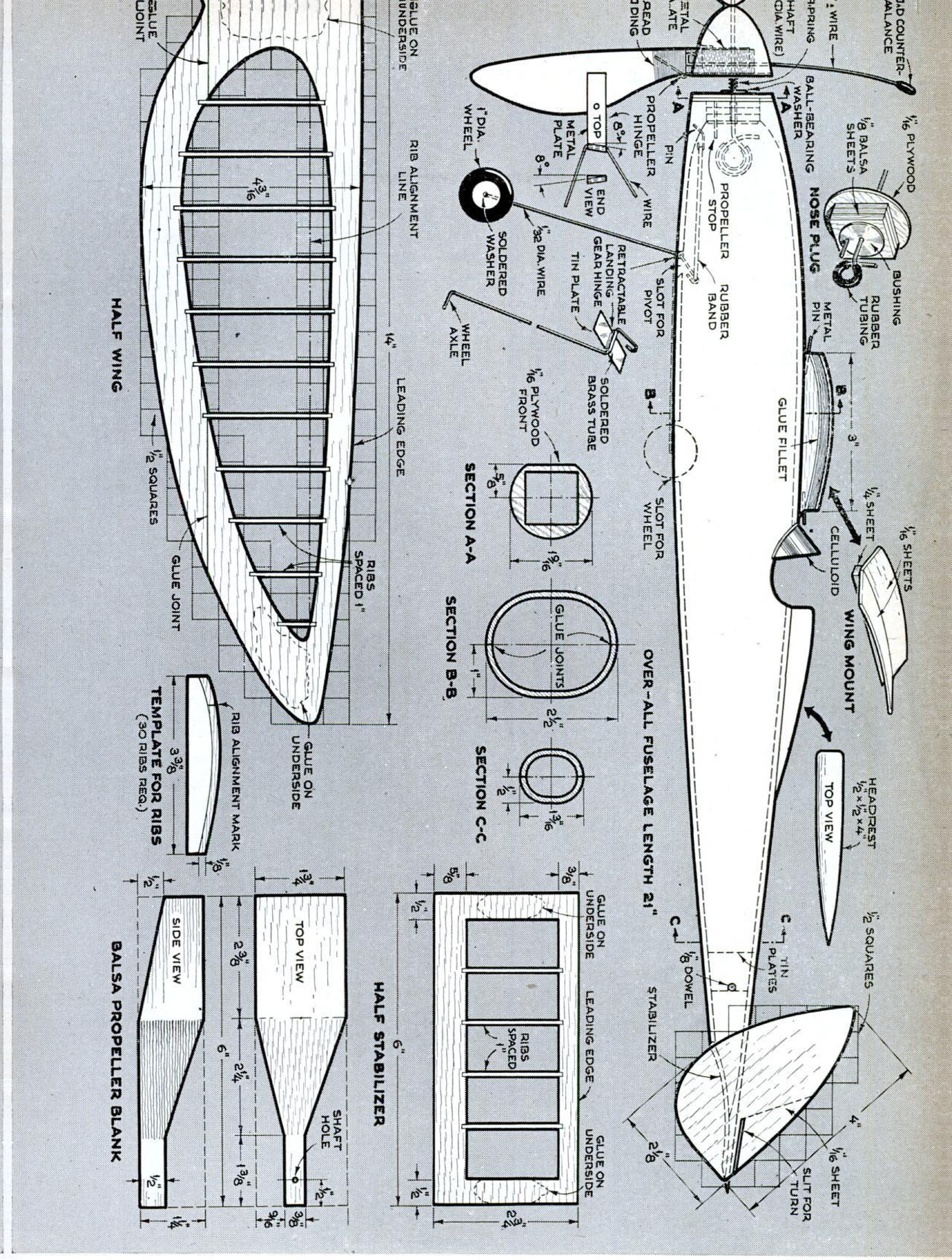
Attach the landing gear inside the right half of the fuselage with a small hinge cemented in place. Up in the lower part of the nose, cement a bent pin far enough away to keep the retracting rubber band taut when the landing gear has been drawn up. To reinforce the balsa where the ⅛″ dowel motor anchor runs through, cement inside the hull two plates cut from tin-can stock and notched around the dowel.

When these parts have dried, glue the fuselage halves together. Add the headrest, wing mount, and 1/16″ plywood nose facing. Let these dry, and then finish with fine sandpaper and wood filler.

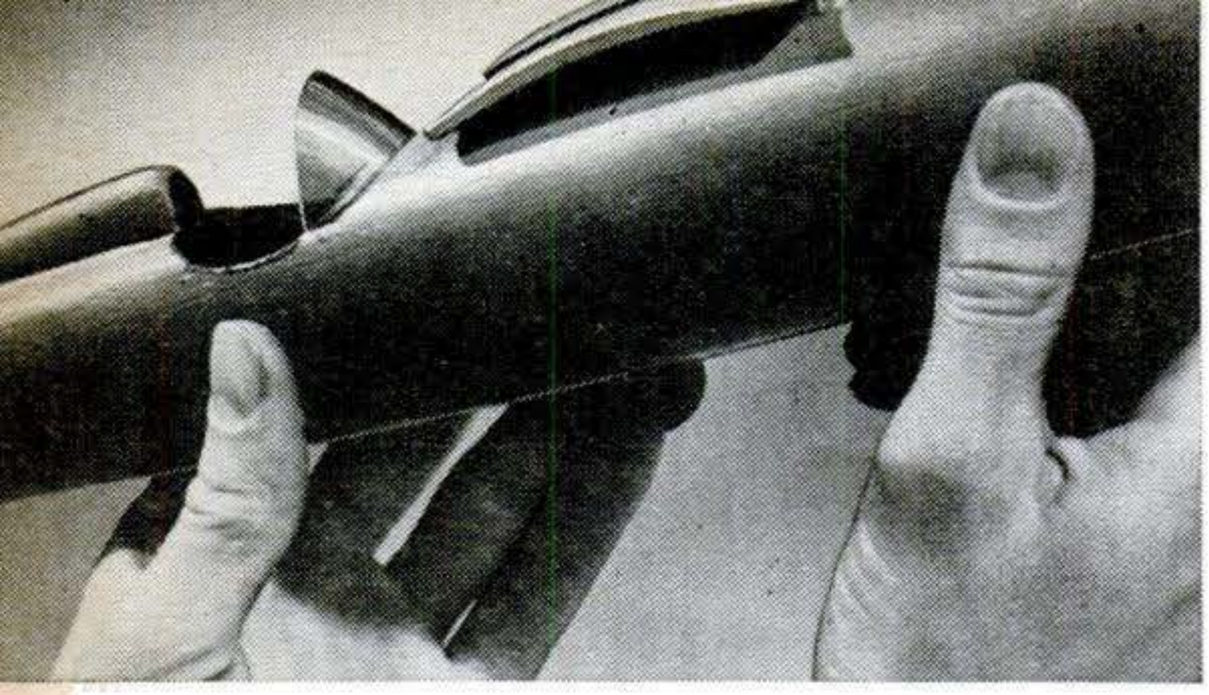
The propeller is carved from a blank to a thin airfoil shape with ⅛″ undercamber. A metal plate is then cemented to the front of the propeller hub, and the spinner is carved to take the hub assembly. Give the propeller and spinner several coats of clear dope, and when the parts are dry cut the propeller blade cleanly from the hub.

Bind the wire hinge on with thread at an angle that will allow the blade to fold back against the flattened side of the fuselage, which fairs into the curve about 1″ behind the nose. Press the counterbalance wire through a drilled hole in the hub, clinch it at the hinge, and balance with the propeller

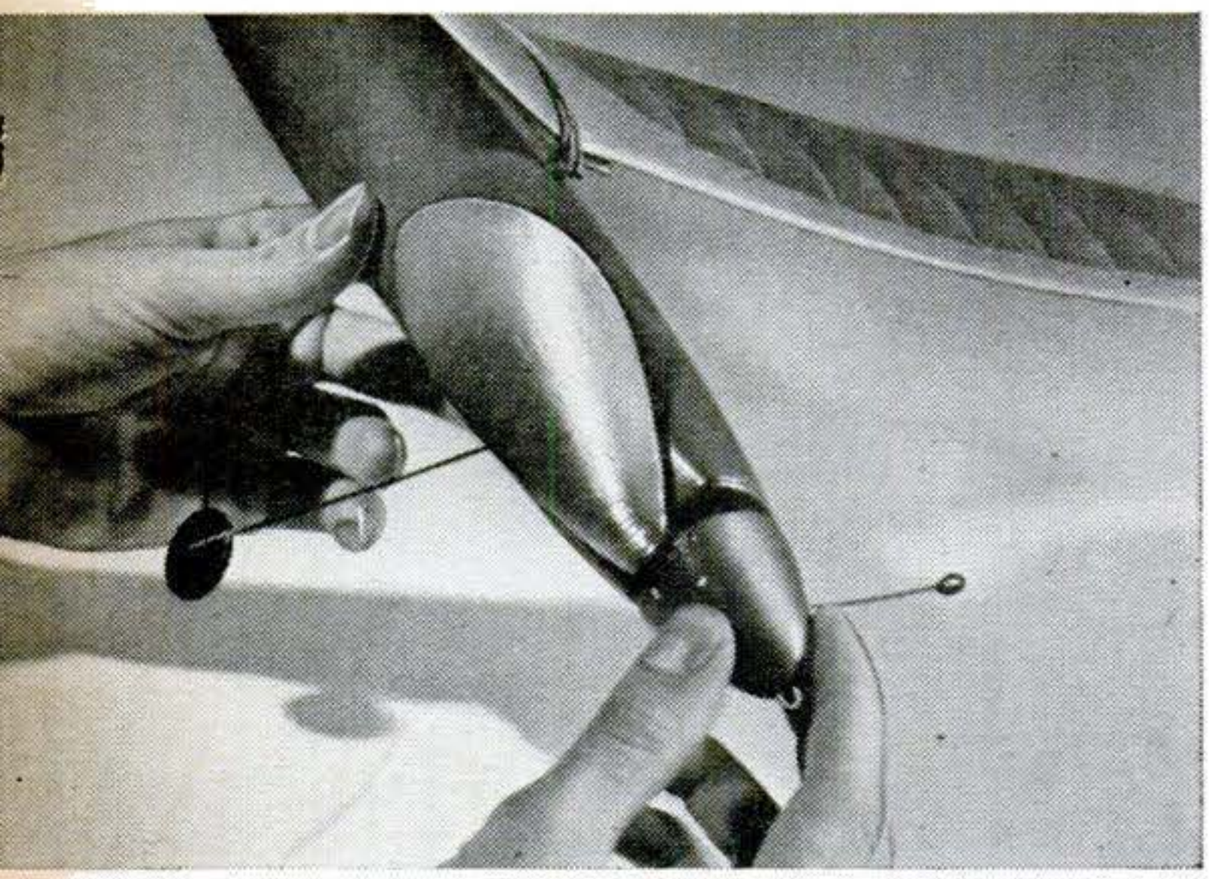
Copyrighted material



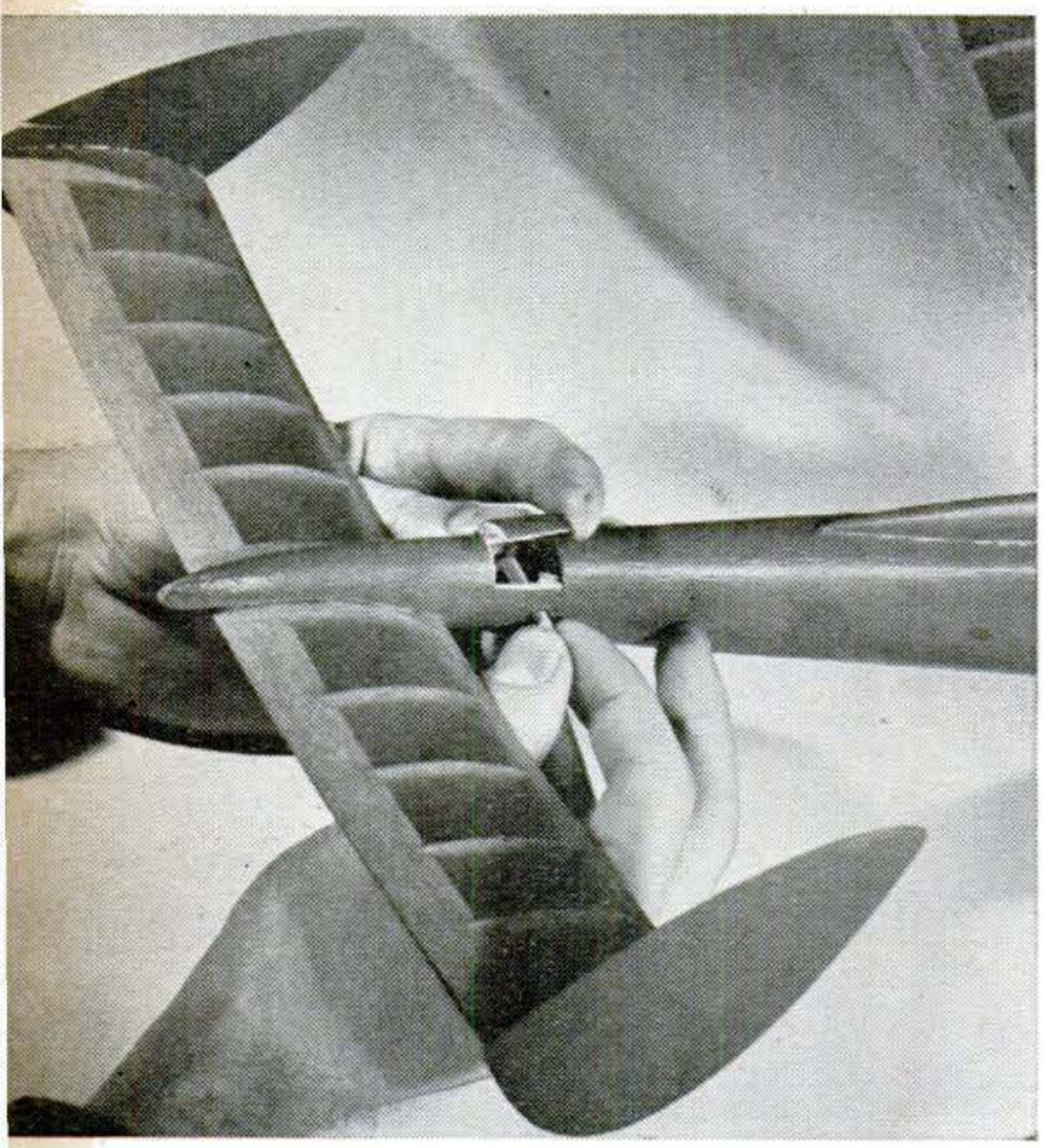
HALF WING
RIB ALIGNMENT LINE
LEADING EDGE
14"
$4\frac{3}{16}$"
GLUE ON UNDERSIDE
GLUE JOINT
RIBS SPACED 1"
1/2" SQUARES
RIB ALIGNMENT MARK
$3\frac{3}{8}$"
1/8"
TEMPLATE FOR RIBS
(30 RIBS REQ.)
BALSA PROPELLER BLANK
SIDE VIEW
TOP VIEW
SHAFT HOLE
$1\frac{3}{4}$"
$2\frac{3}{8}$"
$2\frac{1}{4}$"
$1\frac{3}{8}$"
6"
1/2"
$1\frac{1}{4}$"
9/16"
3/8"
HALF STABILIZER
LEADING EDGE
RIBS SPACED 1"
5/8"
3/8"
$2\frac{3}{4}$"
SECTION A-A
1/16" PLYWOOD FRONT
$1\frac{9}{16}$"
SECTION B-B
GLUE JOINTS
1"
$2\frac{1}{2}$"
SECTION C-C
$1\frac{3}{16}$"
OVER-ALL FUSELAGE LENGTH 21"
NOSE PLUG
1/16" PLYWOOD
1/8" BALSA SHEETS
BUSHING
RUBBER TUBING
BALL-BEARING WASHER
PIN
PROPELLER HINGE
METAL PLATE
TOP
END VIEW
WIRE
8°
1" DIA. WHEEL
SOLDERED WASHER
1/32" DIA. WIRE
WHEEL AXLE
RETRACTABLE LANDING GEAR HINGE
TIN PLATE
SOLDERED BRASS TUBE
SLOT FOR PIVOT
RUBBER BAND
PROPELLER STOP
SLOT FOR WHEEL
METAL PIN
GLUE FILLET
3"
1/4" SHEET
1/16" SHEETS
CELLULOID
WING MOUNT
HEADREST 1/2" x 1/2" x 4"
1/8" DOWEL
TIN PLATES
STABILIZER
1/16" SHEET
SLIT FOR TURN
4"
$2\frac{1}{8}$"



After completion of the fuselage, the wing mount, windshield, and headrest are cemented to the top.



The single propeller blade is hinged to fold back on the fuselage and lessen drag during the glide.



Rubber strands powering the model are anchored in the tail on a dowel. Note the stabilizer camber.

by removing lead from an oversize piece soldered at the outboard end.

Then put a 1/16″ wire shaft through the spinner, the hub, and the nose plug. This plug is glued up from three pieces of ⅛″ sheet balsa, a faceplate of 1/16″ plywood, and a metal bushing. Separate the spinner and nose plug with a washer and spring. A wire stop is inserted in the plug to halt the propeller at the position where it will fold back automatically on the flat. The spring pulls the rubber hook against the stop while a turn or two remains, so the twist of the motor keeps the blade on the flat.

Cut both wings as a single piece from butt-glued ⅛″ sheet balsa, and notch to receive the ribs. Dab cement on the underside at the ends and center to produce camber as the cement dries and draws the wood.

The ribs are marked on a single balsa sheet 1/16″ thick and 3⅜″ wide by moving a cardboard or tin template down ⅛″ for each succeeding rib. Rule an alignment line ½″ from one edge to show on each rib. Align these marks with a similar alignment line on the wings, cutting individual ribs to required length as they are glued in. The same template, shortened to 1 15/16″, is used for the stabilizer ribs. Since the stabilizer sides are square, no line is needed.

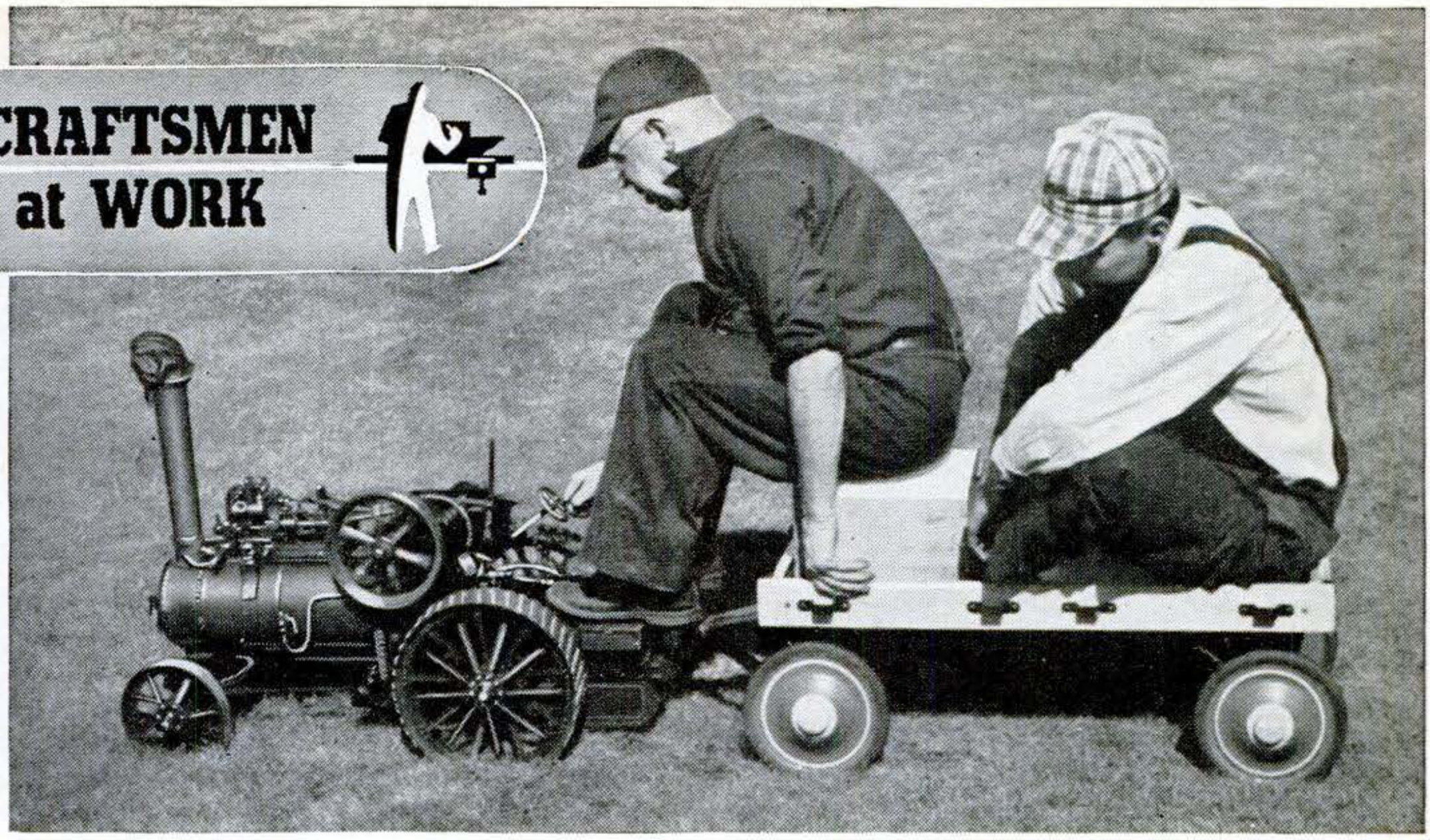
Cut the wings apart at the center, bevel the cut edges for 2″ dihedral under each tip, and glue back together. Cover the bottom when dry and then the top, making sure the tissue touches every part of the rib edges. Doping provides the elliptical dihedral. Except for cutting through at the center, the stabilizer is made the same way. It is also ⅛″ sheet balsa.

The rudders are cut and sanded to shape from 1/16″ balsa, and one is slit to make the plane turn in flight. Apply a few coats of clear dope, cement rudders to the stabilizer, and then cement the stabilizer to the fuselage, giving it a slight negative incidence. Fit the wings to the wing mount, and hold them with rubber bands.

To fly the model, use about 12 strands of ⅛″ flat rubber with 4″ of slack. Lubricate the rubber before mounting it in the fuselage. Try the plane first for a slow, flat glide. If all works well, give the propeller a few turns, watch for any bad characteristics, and adjust as necessary. Continue increasing the turns until you reach the maximum, and then go into your powered flights and long chases. END

Copyrighted material

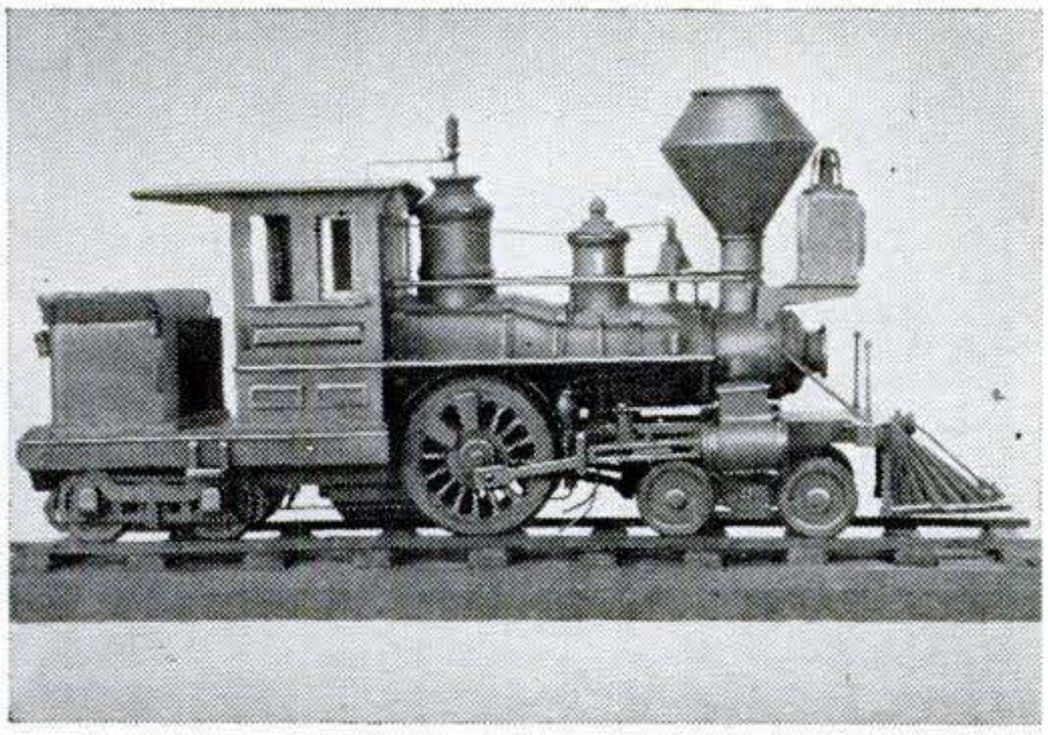
CRAFTSMEN at WORK

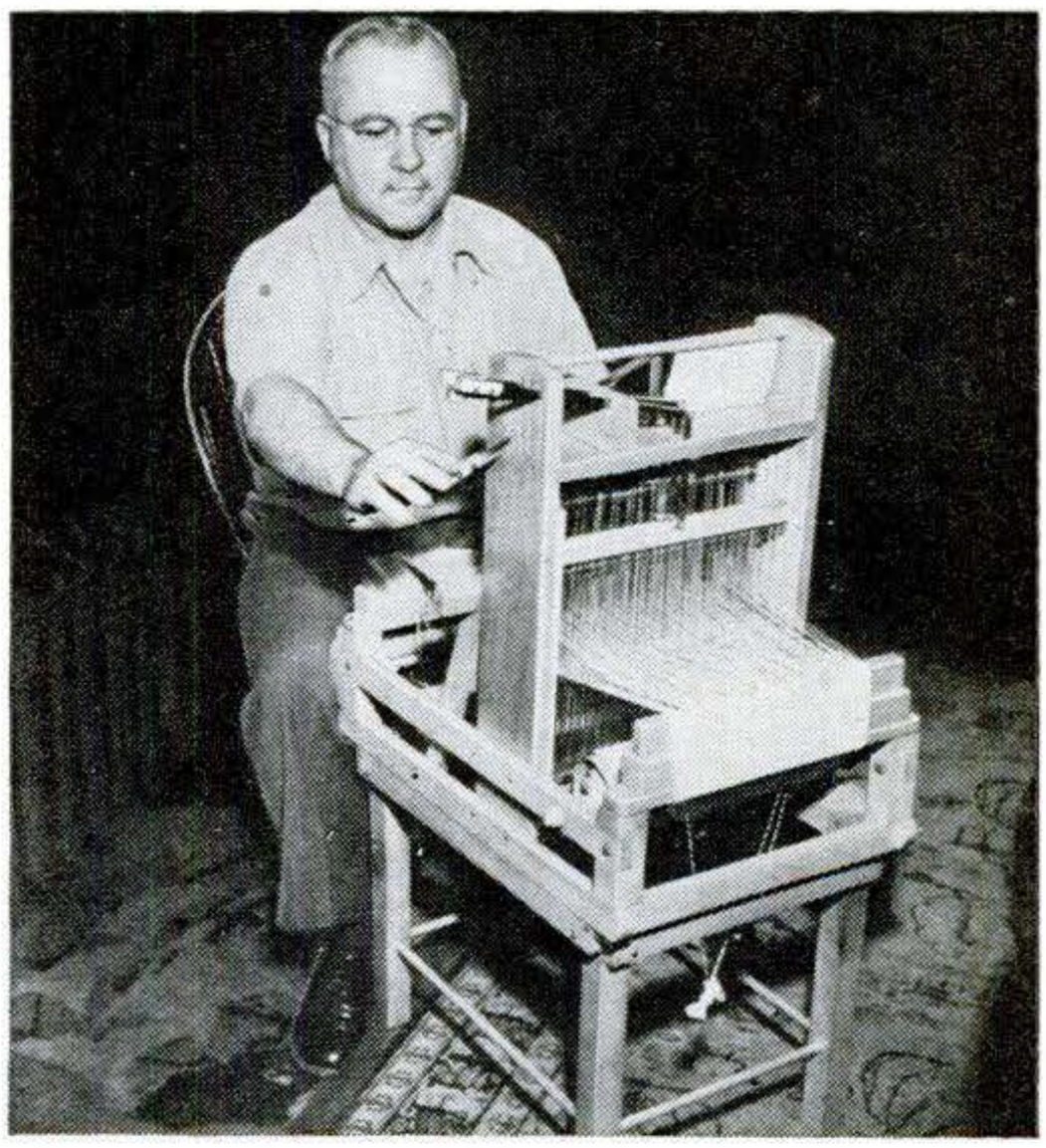


STEAM TRACTOR. With much noise, heat, and smell, this 1½″ scale coal-fired traction engine easily hauls its builder John Matthews (in front) and Charles A. Purinton, both of Chicago, across rough turf. Photographed at a meet of the New England Live Steamers, the little steam tractor works at about 100 lb. pressure. Its single-cylinder engine drives a rear wheel through a two-speed gear reduction and a further chain-drive reduction. A spark arrester on the stack keeps cinders out of the engineer's eyes.

SIDEWALK SAILBOAT. As a Scout project, Johnny Roberts, 12, of Detroit, built a dry-land sailboat. On wheels instead of runners, it rides the breezes of Lake Erie on the sidewalks of Detroit.

SWEETHEART OF THE ESPEE. Plans of the Southern Pacific's first engine, the C. P. Huntington (PSM, Sept. '46, p. 149) so appealed to Herbert F. Trostle, of Bridgeton, N. J., that he got busy. Below is his wooden model of the famous iron horse.

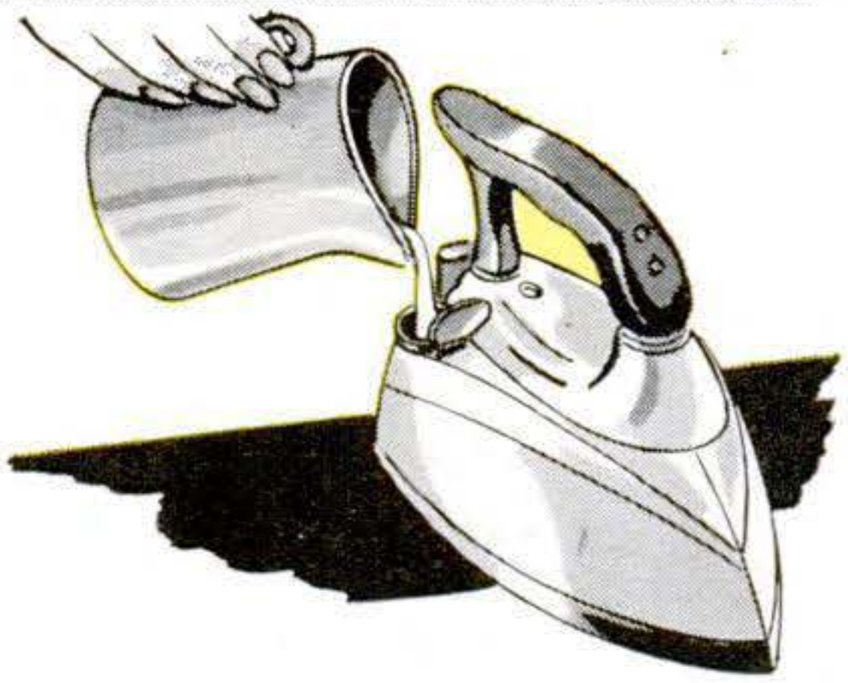




HOBBY TURNED BUSINESS. Because Charles Bolleter, of Linden, N. J., enjoys building hand looms, he sells his handiwork to home weavers. Above is a four-heddle model of 14″ width capacity. Made in two weeks of spare-time work, it'll sell for $30.

Copyrighted material

KEEPING the HOME SHIPSHAPE



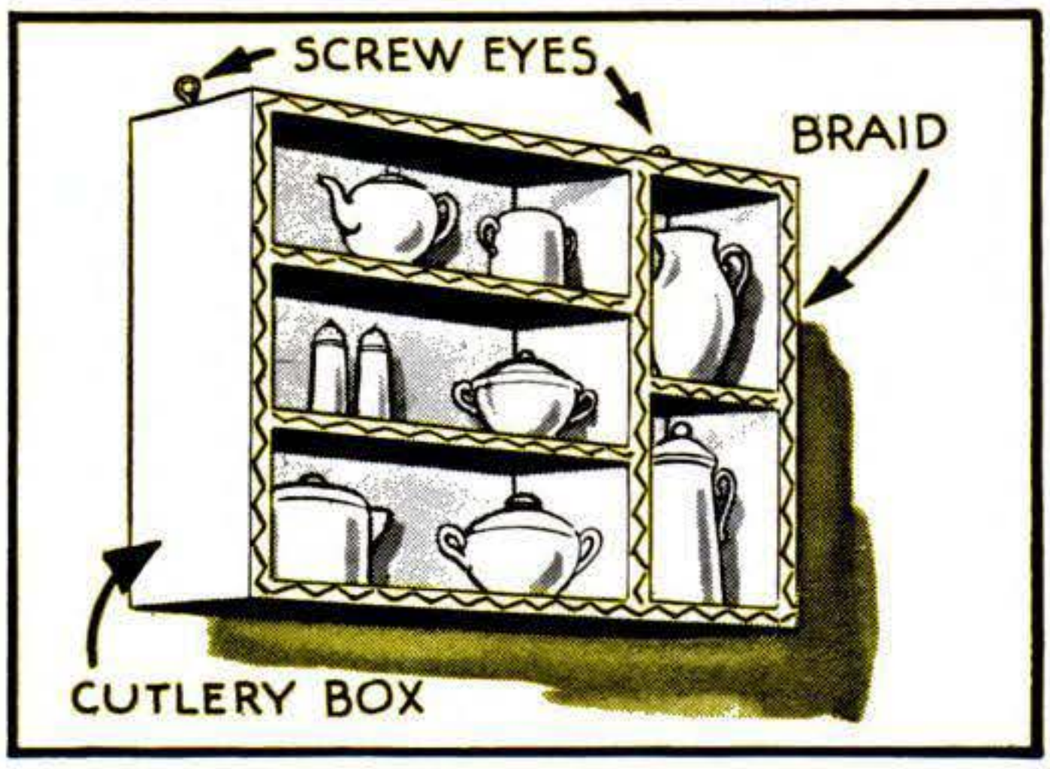
Because the minerals or chemicals in ordinary tap water will sometimes cause corrosion, makers of steam irons recommend the use of distilled water with their irons. Water obtained when a refrigerator is defrosted is pure enough for the purpose.

A double electrical outlet attached to some easily reached part of the breakfast table makes it unnecessary to bend or stretch when you want to use an appliance at the table. The outlet plate can be painted to harmonize with the table or kitchen.

Want to peel an orange without spattering the pulp or juice? Dig the heel of a paring-knife blade into the skin and draw it backward around the middle of the orange. Then insert a smooth teaspoon handle into the cut and work it around until you've pried the peel loose. Remove one half, then the other.

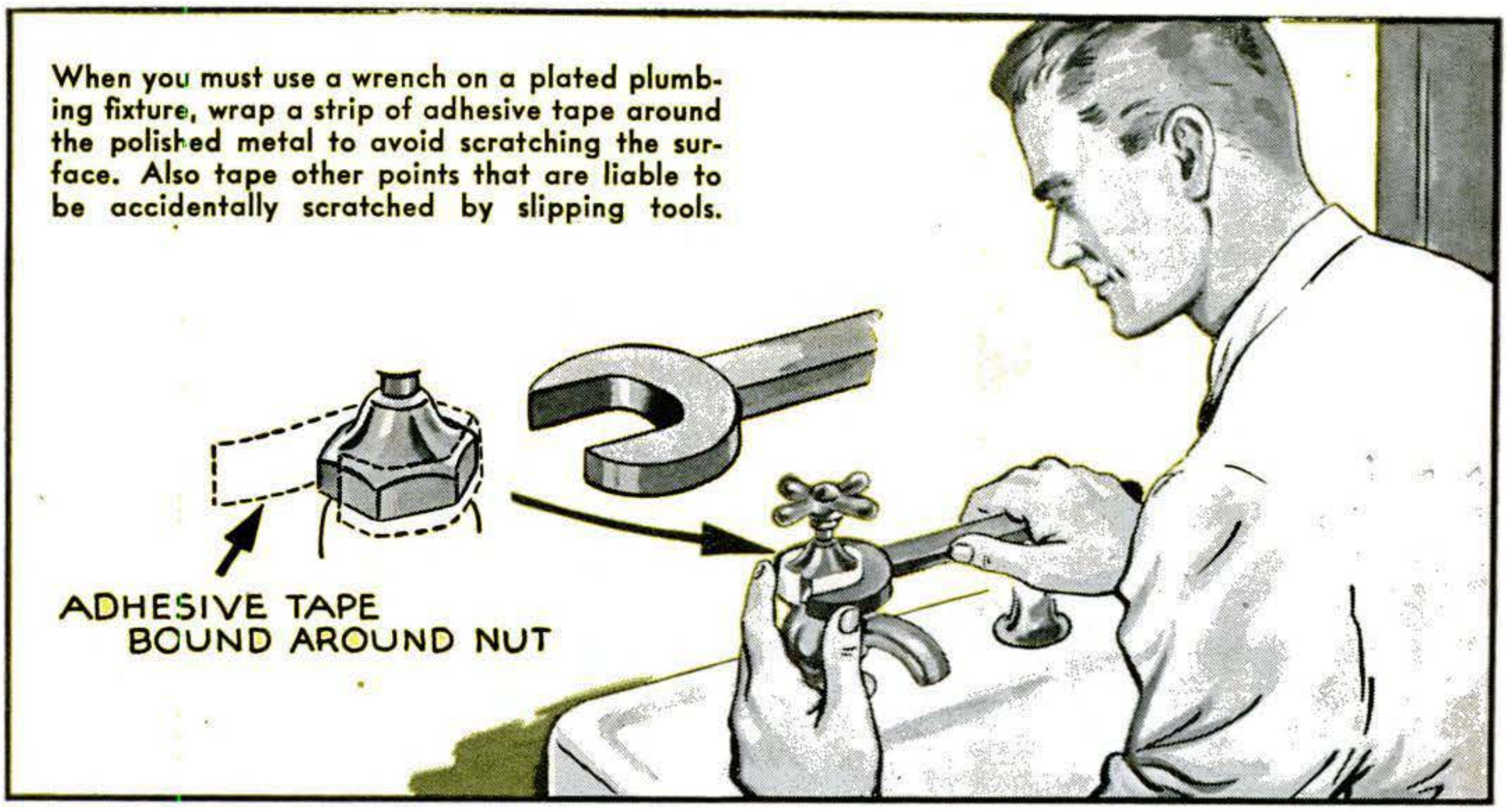
You will always know how many jars of each kind of home-canned food you have left if you number the containers and then use up the stock from the high number down. Use label stickers or write directly on the glass or metal with a china-marking pencil. When adding new jars, renumber those that are left.

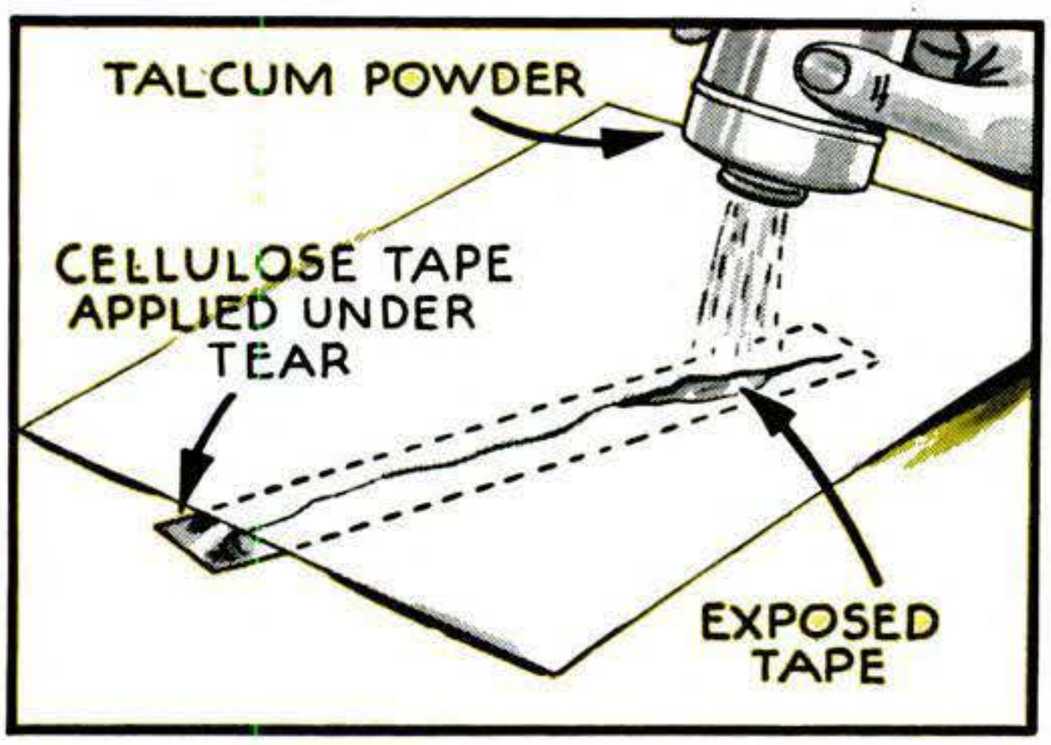
A whatnot shelf for decorative miniatures can be made from a wooden cutlery box as shown below. Add an extra separation to the end tray, paint the box, and trim the edges with decorative braid or tape. The box may be suspended from screw eyes.



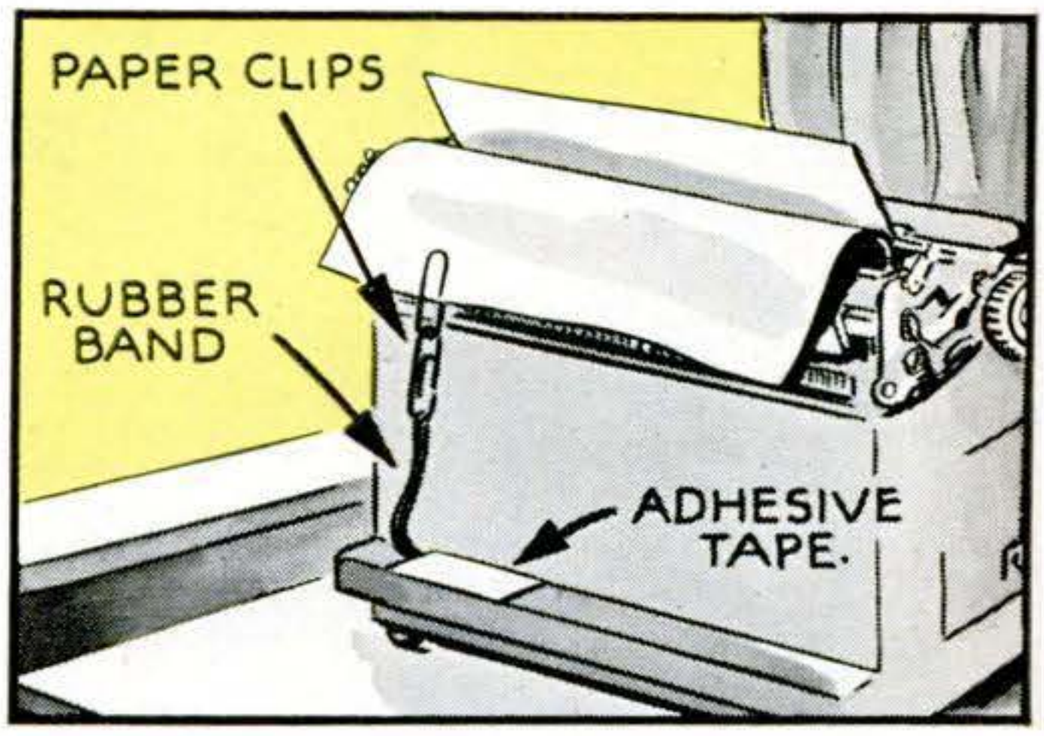
Copyrighted material

When you must use a wrench on a plated plumbing fixture, wrap a strip of adhesive tape around the polished metal to avoid scratching the surface. Also tape other points that are liable to be accidentally scratched by slipping tools.



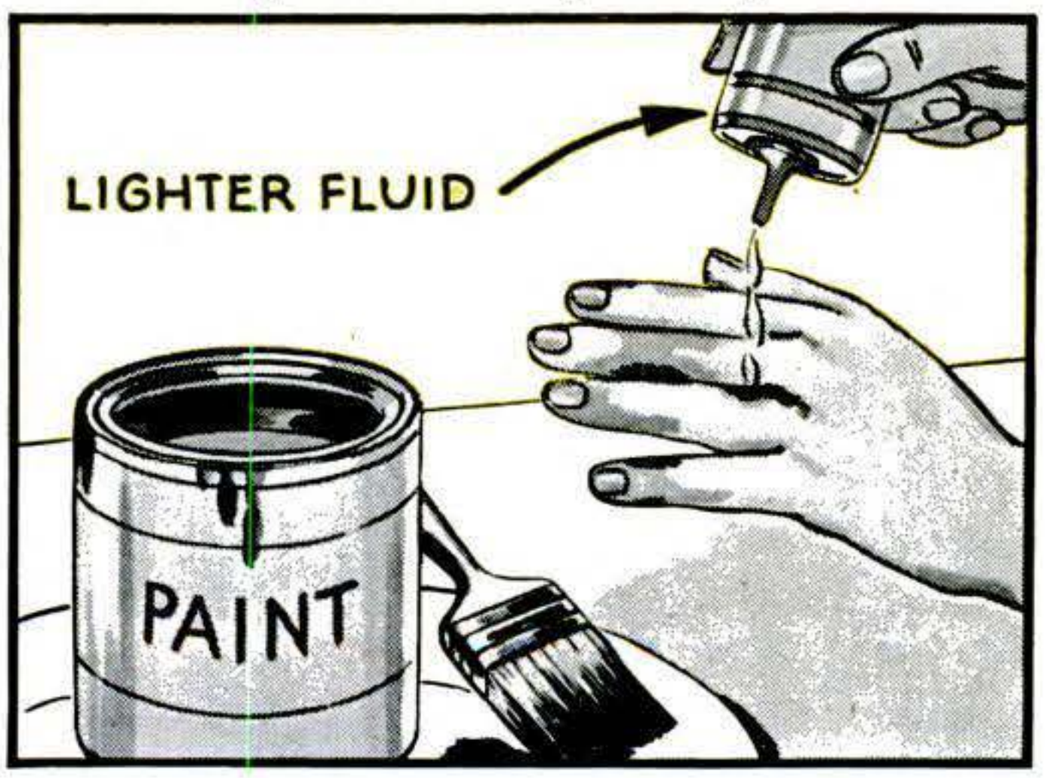


Transparent cellulose tape used to mend torn pages leaves a sticky residue at the edges and wherever any part of the tape is exposed through a tear. To prevent a mended page from sticking to others, rub some flour or talcum powder over it. Exposed parts may also be covered with tape facing the other way.

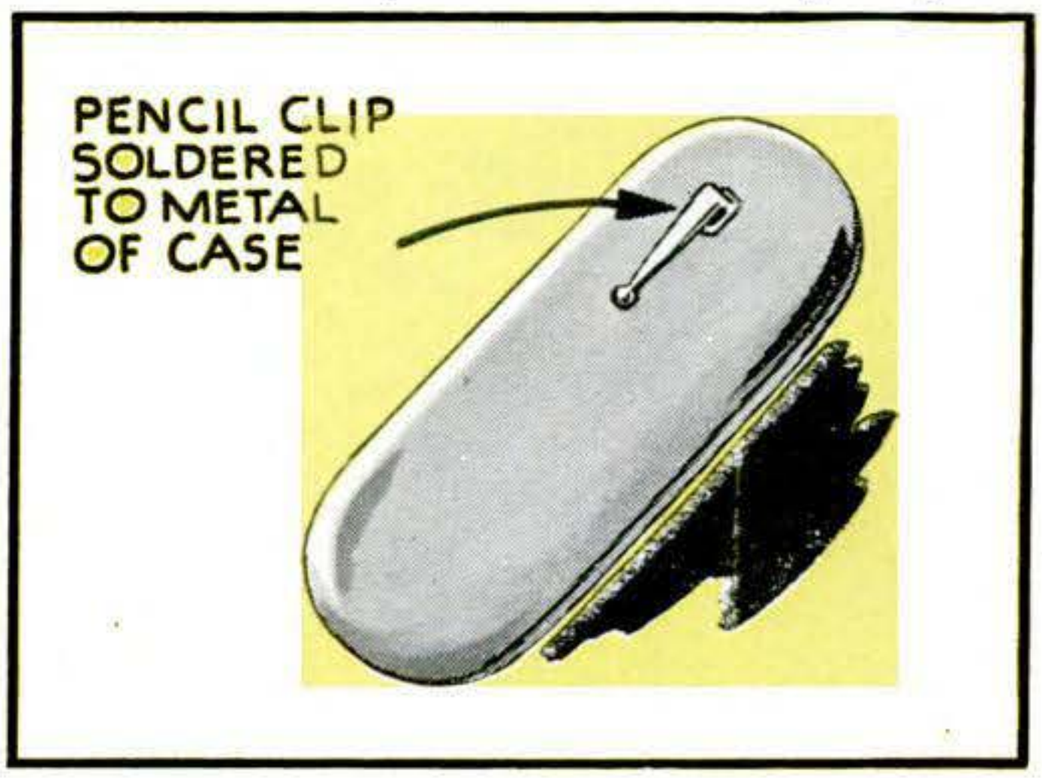


Do summer breezes blow the paper around when you type? A rubber-band and paper-clip holder, above, will solve the problem. Add clips until the length of the holder is great enough to secure the paper but too short to reach the roller. It will then slide off automatically when the paper moves up.

After completing a painting job you may discover that you've run out of turpentine or other thinner with which to remove paint from your hands. A few drops of cleaning or lighter fluid will quickly remove the spots and save you a trip to the store.



That eyeglass case that keeps falling out of your breast pocket when you bend down will stay put if it is clipped to your pocket. Flatten the top of a pencil clip, scrape through the cloth or leather cover of the case, and solder the clip in place.



Copyrighted material

FIZZ QUIZ. What to do when my party ran dry for want of soda water didn't stump me long. I used dry ice and a pressure cooker to wet it again. After making sure the valve of the cooker was working, I filled it with water, added dry ice, and put the lid on. Result: a pot full of ice-cold carbonated water in a flash.—DUANE F. BURDICK.

WHAT'S YOUR INGENUITY QUOTIENT? IQ

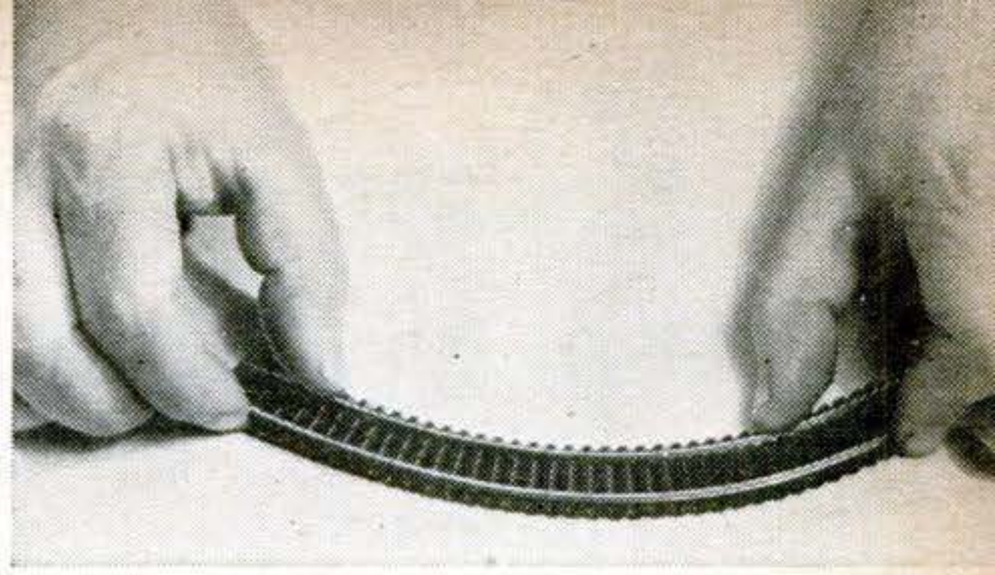
I'M NO OCTOPUS. So when the choke cable broke, I couldn't cover the carburetor air intake and press the starter too. An old shirt saved me. With one sleeve in the carburetor and the other through the window, I started the engine, yanked the sleeve, and was off.—WILLIAM SNYDER.

IT MADE ME SORE to saw a stack of logs by hand, but I soon saw a way to cut my work. A block bolted to my car's rear-wheel hub drives a wooden pitman to which the saw is clamped. The three other wheels are firmly chocked fore and aft to keep the bus from cutting loose.—C. F. CHAPTER.

Have you pulled off a smart one lately? We will pay for acceptable contributions showing ingenious solutions of problems in the home, shop, garage, or camp. It doesn't matter if it's wacky — if it works.

A DRILL PRESS NAMED JOHN. Drilling iron plate was a boring job demanding lots of muscle, until I hinged a board to the wall and put my brace under it. My son presses the seat of his pants against the board, I turn the brace, and the weighted bit makes the chips fly.—V. GAUTHIES.

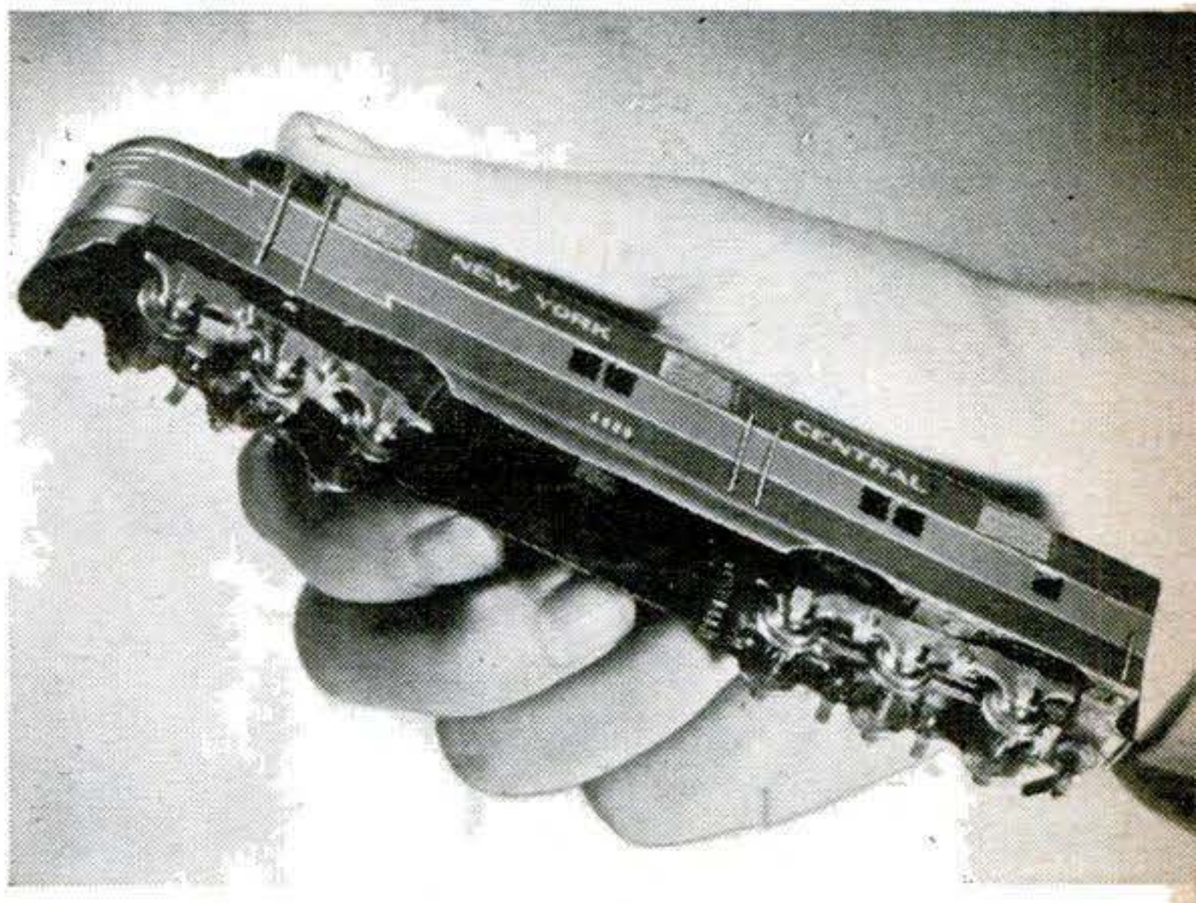
Copyrighted material



At left, the components of a TT set. The locomotive is driven by a 12-volt D.C. motor, and runs on either dry batteries or the midget power pack shown. Above, plastic tie strip being bent to shape.

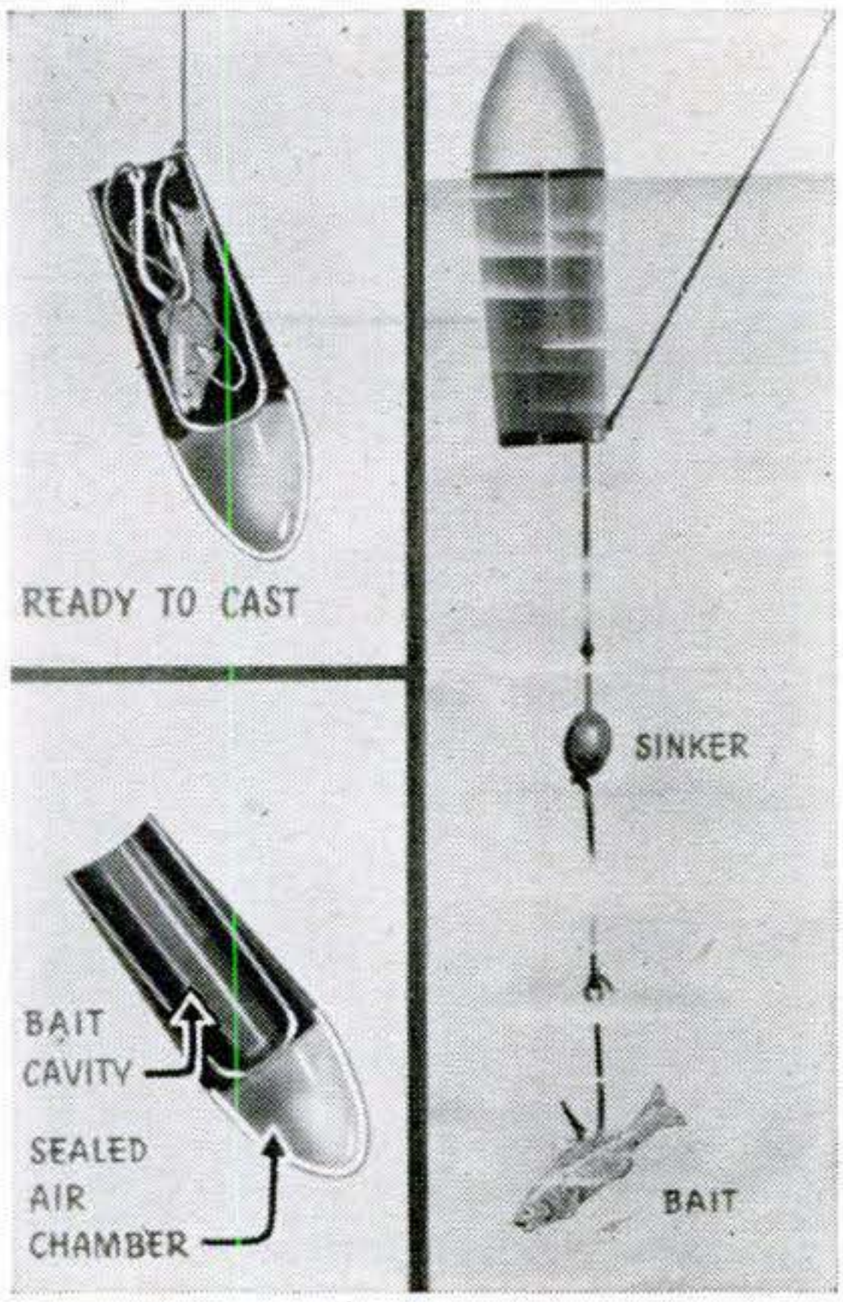
Table-Top Trains Are Scaled from Actual Rolling Stock

SCALE versions of engines and cars in use on American railroads, these tiny trains are one third smaller than HO gauge. Tracks measure 15/32″ from rail to rail. The equipment, known as TT (table-top) gauge, is manufactured in kits and sets by H. P. Products Co., of Hartford City, Ind. An apartment-dwelling hobbyist can now make semi-permanent layouts without crowding himself out of his house. Molded tie strips about 9″ long are cemented to a firm base and can be bent to any radius over 18″. Track, which comes in 21′ lengths, is pressed into grooves that are preformed in the ties.



Relative size as well as the intricate detail of these trains may be judged from the photo above. A variety of models and accessories is planned.

Float Holds Bait During Cast and Drops It to Preset Depth



LIVE-BAIT fishermen can enjoy the mobility, distance, and accuracy of plug casting by using the bait-holding float made by the Eureka Specialty Co., Inc., of Eureka, Kan. Bait placed inside the cavity in the float is protected from loss or damage during the cast. When the float hits the water, the air chamber in the nose rights it automatically and permits the sinker to drop the bait to any desired depth.

Crossed-Wire Sight Fits Revolvers

QUICKER and more instinctive sight alignment is offered to pistol marksmen by Dockendorff & Company, of Oronoque, Conn., makers of a new crossed-wire gun sight that can be clamped to the front of any revolver barrel. The wires are easily adjusted to intersect the top and center of the front barrel sight. Price is about $4.

The 1-oz. sight is 2¼″ high and 1⅞″ wide.

Copyrighted material

Jigsawed Pieces Build 100 Animals

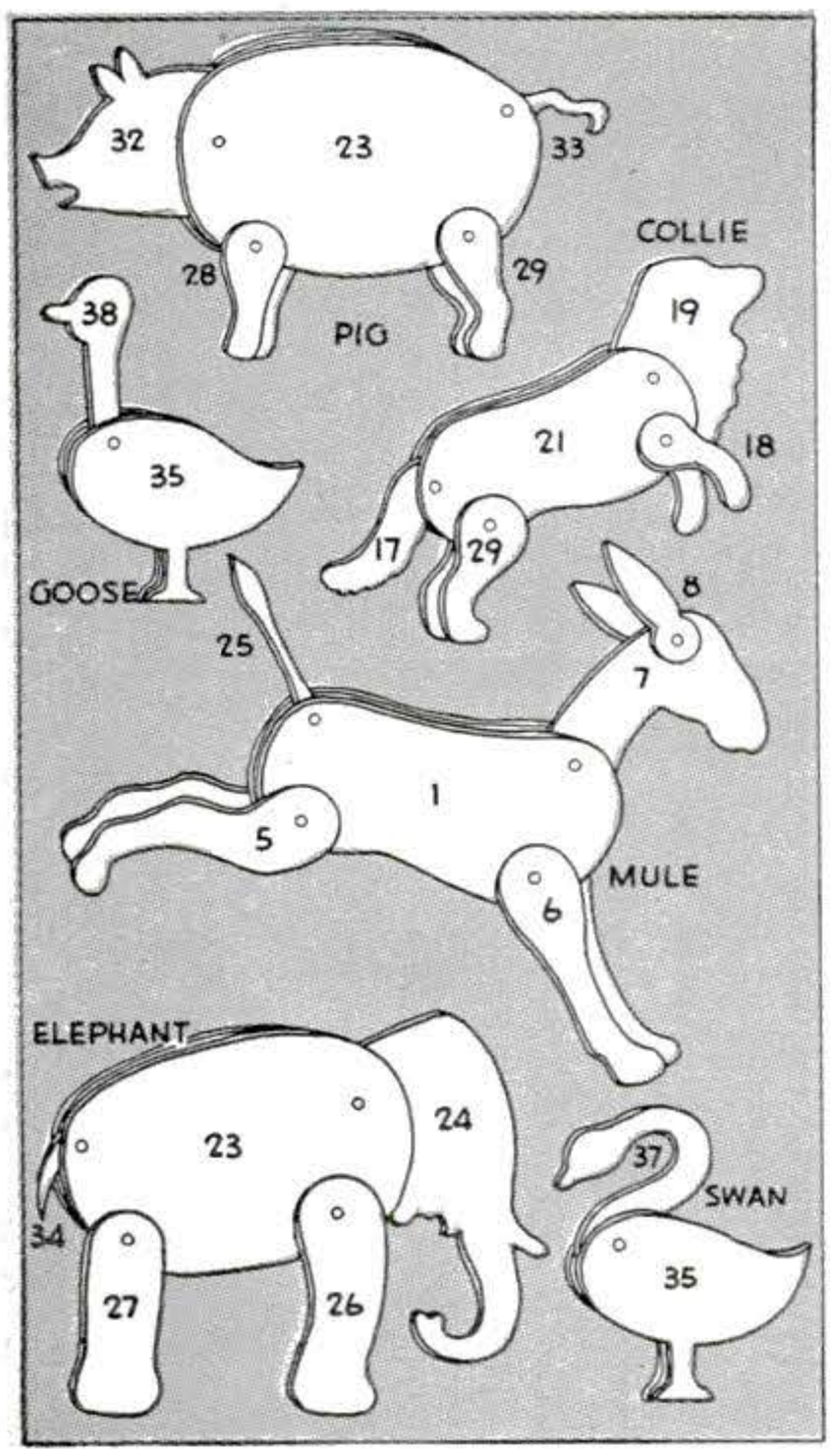
By HI SIBLEY

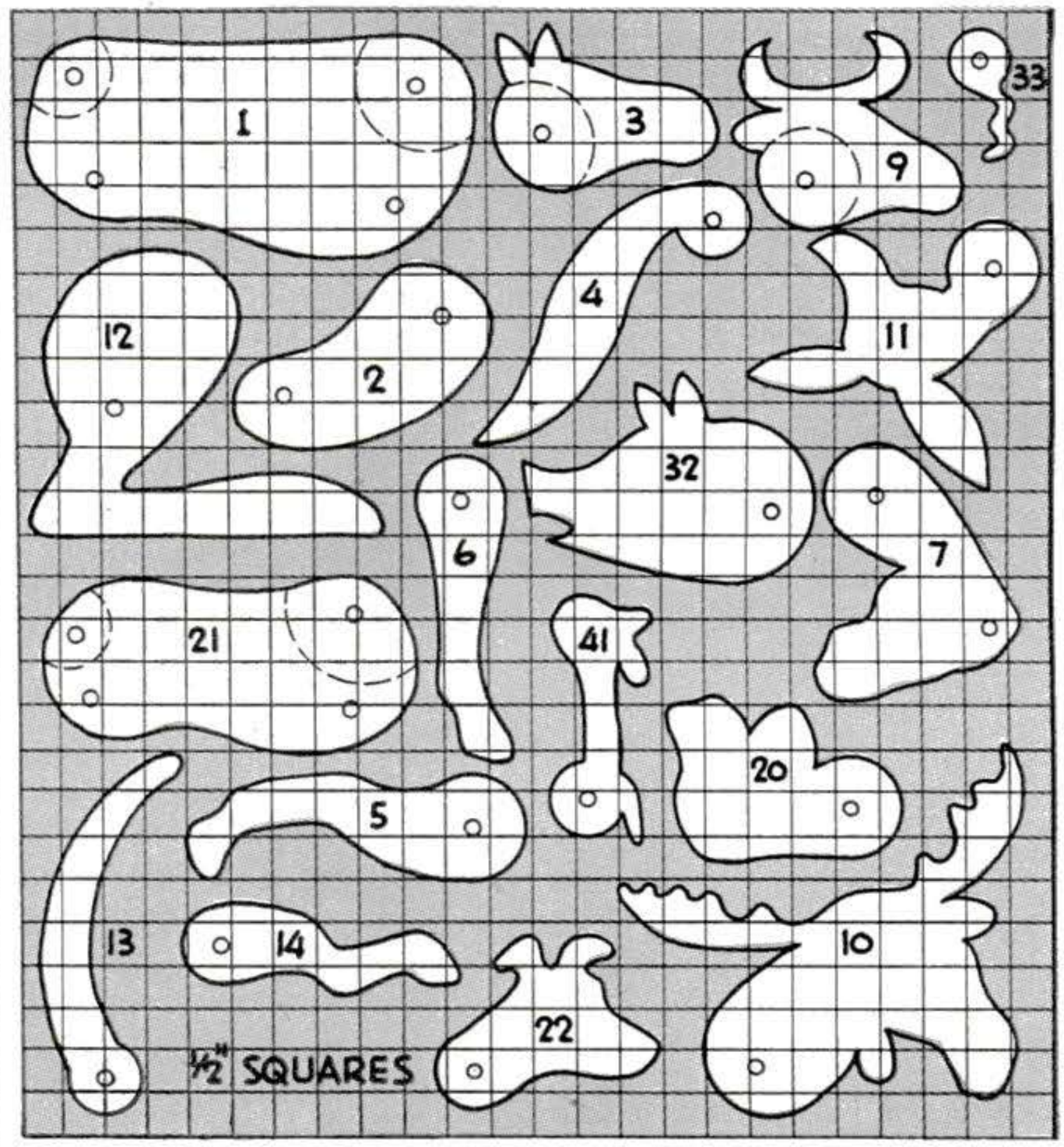
FARM and circus animals—a complete assortment of them—can be built by a child from the 41 jigsawed parts below. The pieces are cut from ⅛″ plywood, or such solid stock as cigar-box wood, and are bolted together, either somewhat loosely so the joints will move or tight with the parts in fixed position.

A typical assembly is shown in Fig. 1. The body is glued up as a sandwich, the center "filling" having cutouts to receive the head and tail. Legs are put on the outside, as in Fig. 2. If knurled nuts are available for the ⅛″ machine screws, washers and a small wrench will not be needed. Sand the joints of necks and tails so they can be slipped easily into their sockets.

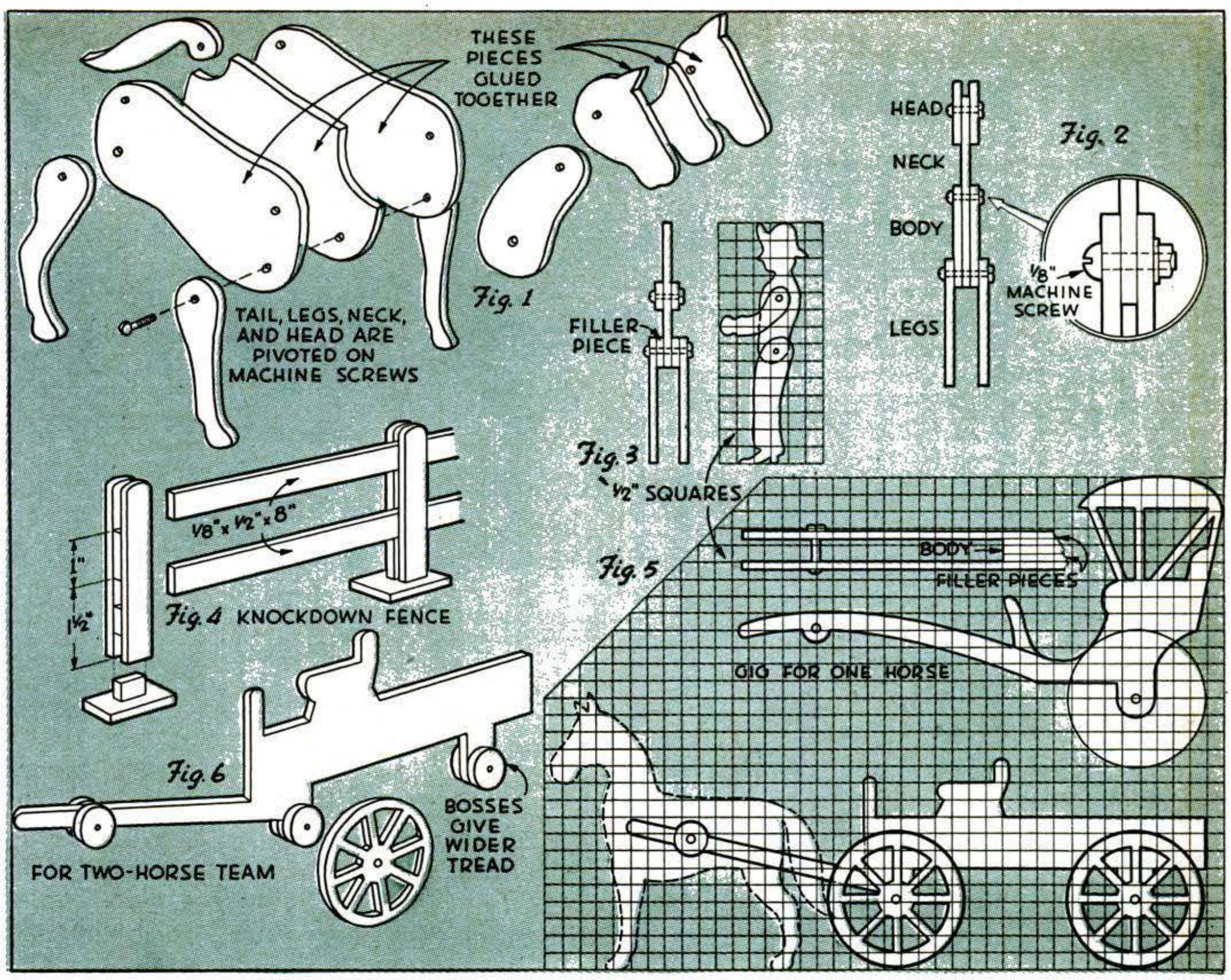
The man shown in Fig. 3 is constructed with legs spaced wide enough apart to straddle the horse. Posts for the fence (Fig. 4) are glued up, and the rails are simply set in the sockets with the joints meeting at the middle. The farm wagon and gig shown in Fig. 5 have wheels that turn. These are the same for both vehicles. Make the shafts of the gig far enough apart to accommodate the three-ply body of a horse. The wagon has a single tongue, as in Fig. 6, for a two-horse team bolted through from the sides. Bosses at the axles will make the tread wide enough for the vehicles to stand upright.

Parts for a variety of animals are shown in outline below and on the facing page. The center body section, or filler, is cut out for joints as indicated by the dotted lines. There are four main groups, each using the same body—horse, mule, cow, moose, and kangaroo; pig, elephant, hippopotamus, and rhinoceros; fowl; and dogs. Each member is numbered so the combinations can be chosen easily. Note that the cow is made by reversing the horse body end for end and using the neck upside down. So many more combinations are possible that a child will be able to make up no end of strange creatures, many of which would baffle the most learned of zoologists.

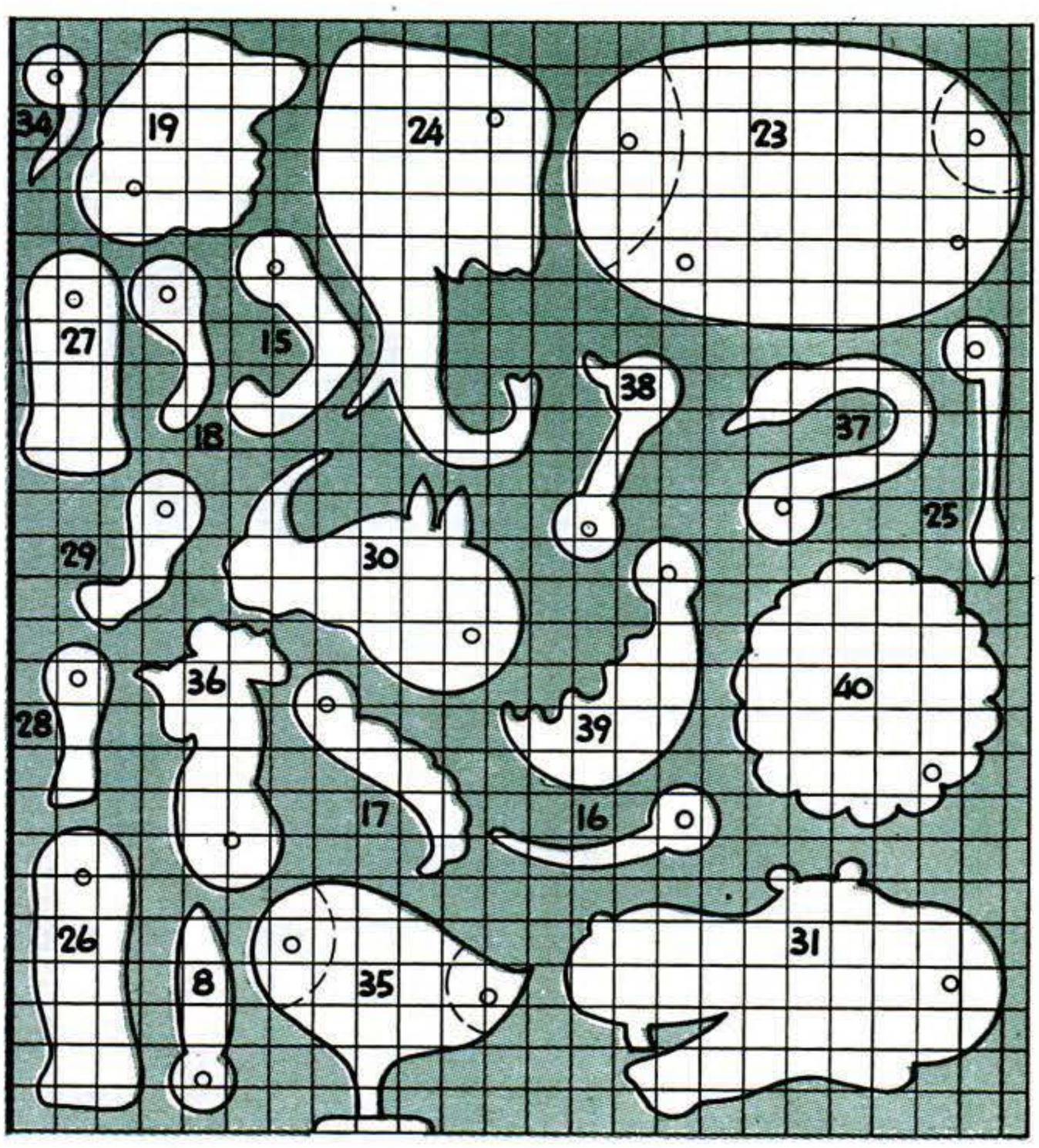


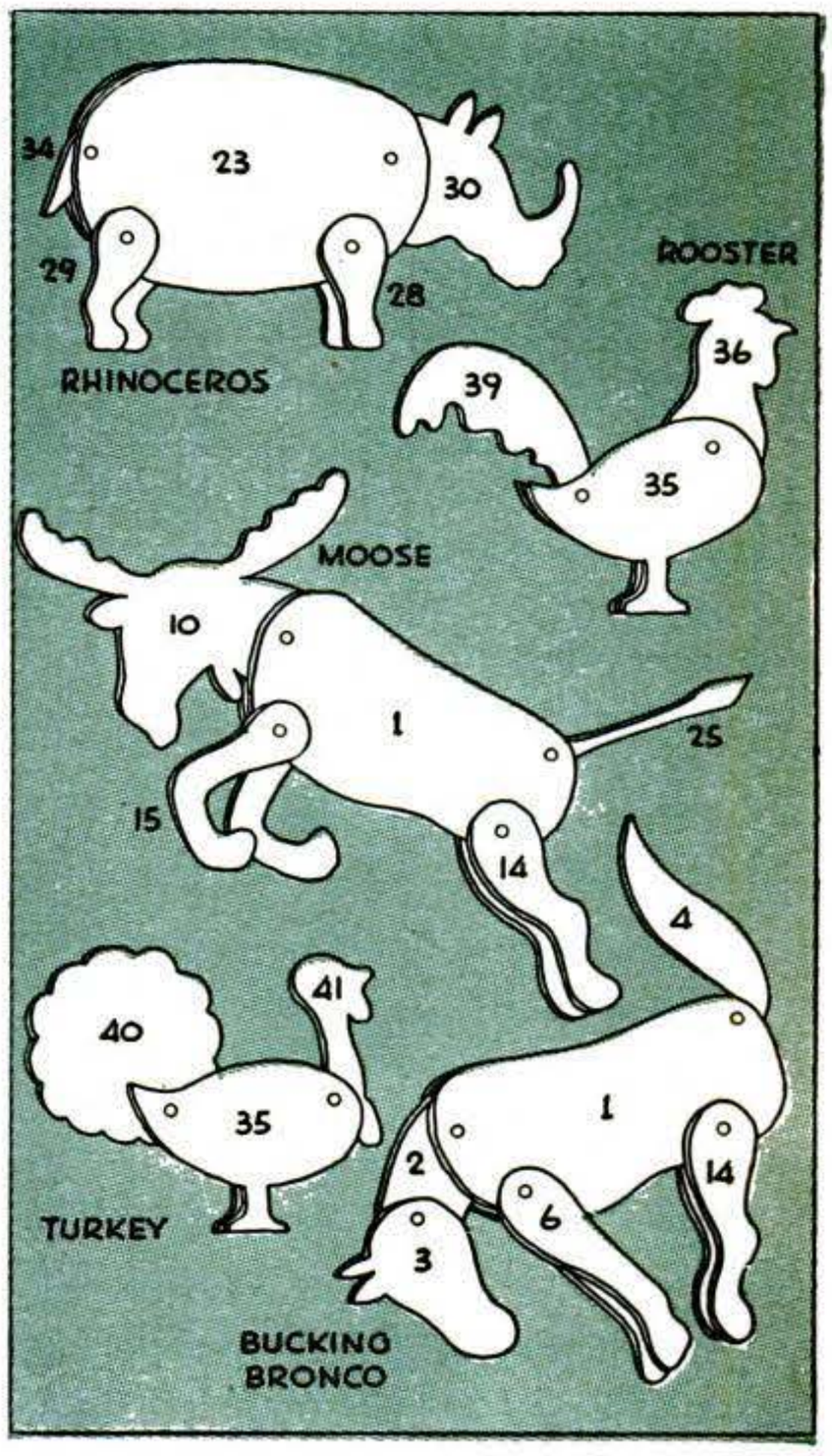


Copyrighted material



Typical construction of figures for a toy barnyard. The animals below are assembled just as the horse is.





Copyrighted material

Car-Trunk Boat Carries Two

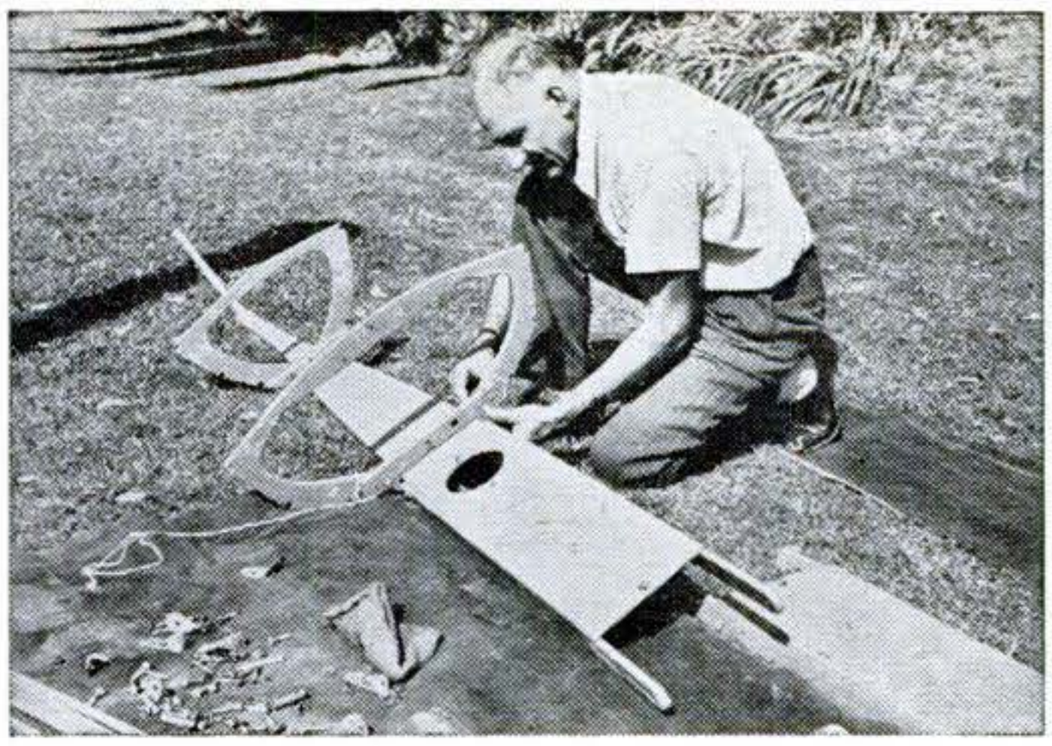
Stowed in compact packages beside the spare tire, car tools, and camping gear, this folding boat is carried easily by Professor Bauwens down to the shore. It can be assembled in 22 minutes.

CANVAS and plywood form the principal parts of this knockdown boat built by George O. Bauwens, professor of civil engineering, with the assistance of students in the shops at the University of Southern California. It is a 62-lb. craft, 17′ 9″ long, and is designed to be carried in the trunk of a car. The boat can be assembled in 22 minutes and taken apart again in 15. It carries two persons and, though frail in appearance, is sturdy enough for shooting rapids. To prove it, Professor Bauwens and three student companions recently negotiated 168 miles of the rapid- and whirlpool-studded Colorado River in this boat and another like it. They made the trip in 10 days without even getting their feet wet.

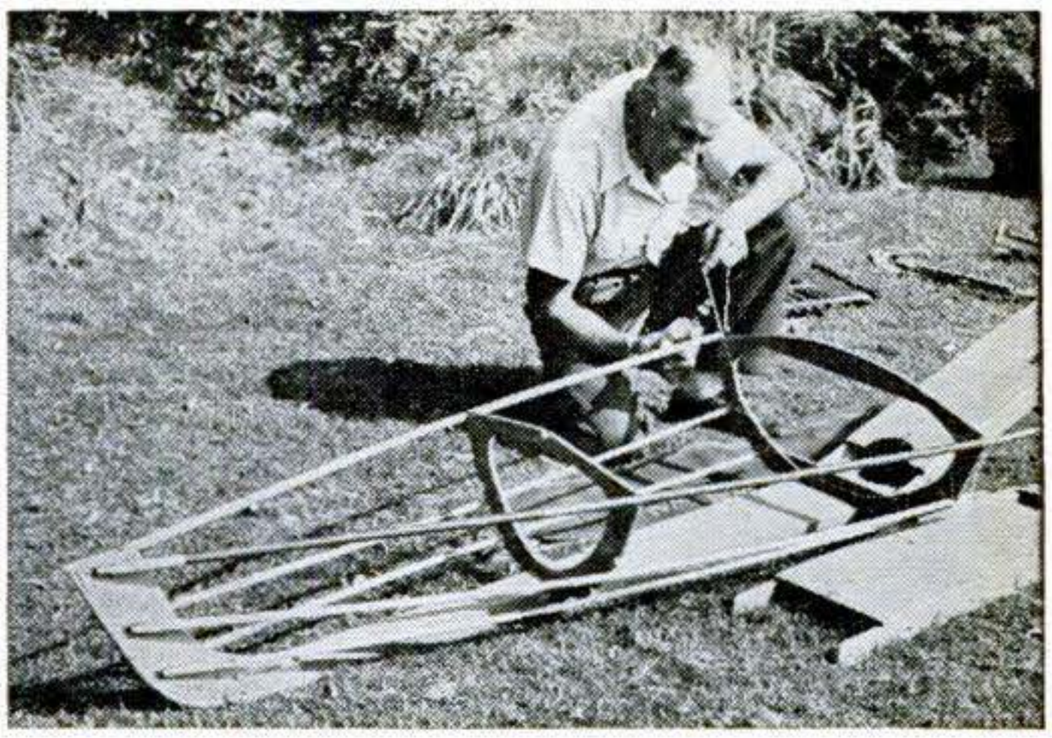
The boat consists of five main assemblies —a collapsible keel, bulkheads, longitudinal stringers, a waterproof-canvas covering, and gunwale. No tools are needed. Bolts fitted with wing nuts and strong cord are the only fastenings that hold it together.

1 Two parts of the keel are bolted together here by Professor Bauwens. No tools are required since wing nuts are used. There are six parts to the keel. Joints are numbered for convenience.

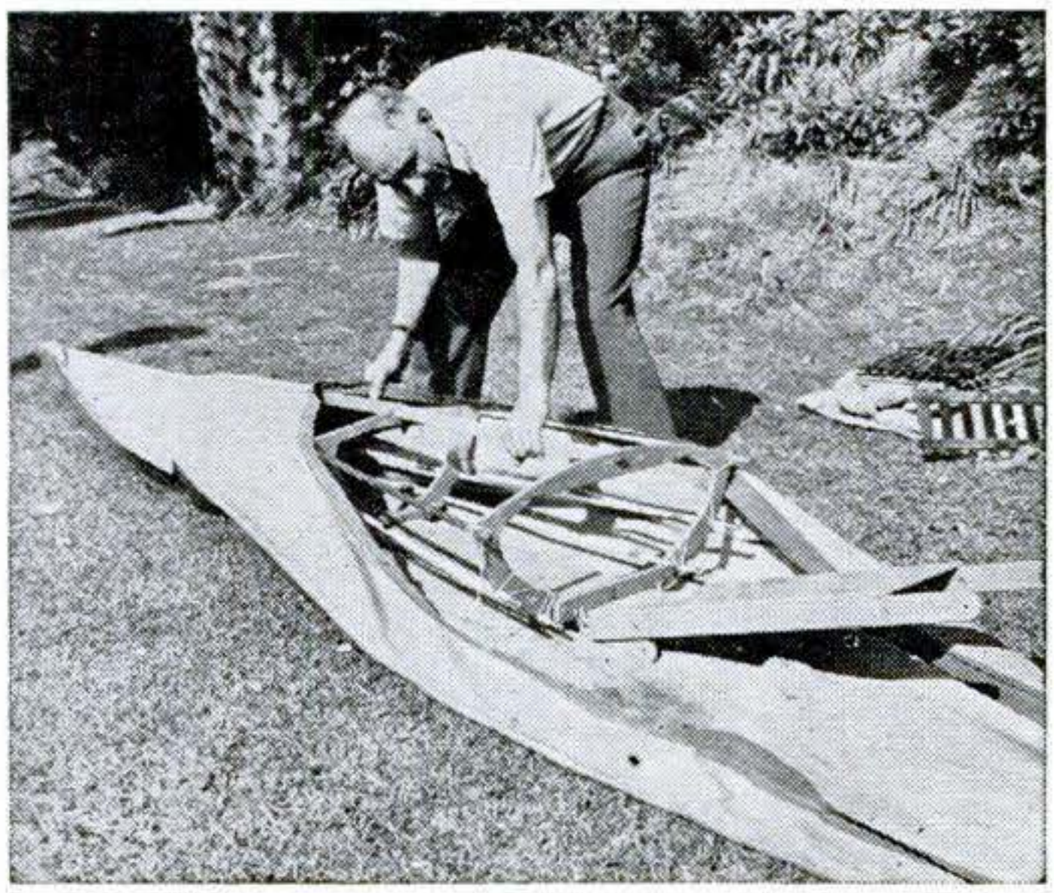
Copyrighted material



2 Bulkheads fastened in place give the framework shape and rigidity. Of ⅝″ plywood, they are light in weight without sacrificing strength. The two halves of the keel are not yet joined.



3 Stringers are lengths of dowel rod fitted into sockets on stem and bow, slipped into notches in the bulkheads, and then simply tied on tightly with several pieces of strong cord.

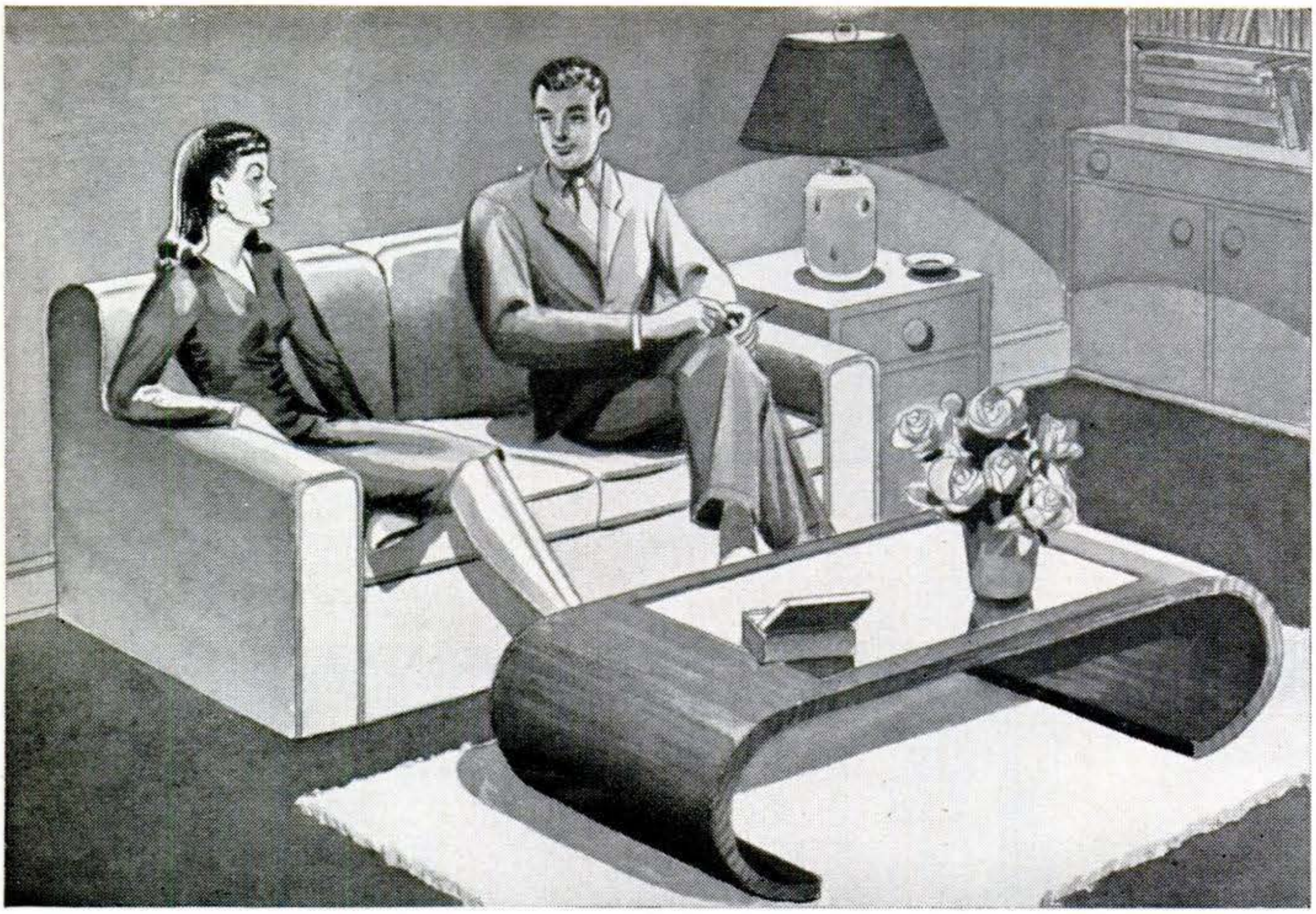


4 Waterproofed canvas forming the one-piece hull covering is next pulled on over the two ends of the frame much as a glove is put on the hand. The ends are pushed in as far as possible.

5 Then the keel is bolted at center and pressed down with the foot to make the canvas taut and the keel stiff and straight. This action is like that of a shoe tree pressed into a shoe.

6 Two men can be carried by the boat, and one man can carry it. Complete with gunwale attached, seats installed, and two double-ended paddles, the boat weighs only 62 lb. It is 17′ 9″ long. With three companions in this and another boat like it, Professor Bauwens recently shot the rapids and negotiated the whirlpools of the treacherous Colorado River, covering 168 miles in 10 days.

Copyrighted material



Veneered Table Uses Little Wood

By Edward E. Thorp

VENEERING is always a fascinating art to the craftsman who works with wood. This project provides the additional interest of gluing veneer sheets to both convex and concave surfaces. The end result is a satisfyingly handsome coffee table that will fit in well with any modern furniture.

Structurally the table is simply a frame to hold a clear-glass or mirror top and a framework on which to glue the veneer. Any clear glass used should be preferably of double thickness, and a 3/32″ allowance for clearance must be made in the frame. If a suitable piece of glass is on hand already cut, the size of the table top may well be altered to fit. A wood panel may be used instead of glass or a mirror. Attractive contrast will be gained if it is different in color from the veneer.

If the leglike ends are laid out in quarters and eighths of a circle from a cardboard template, these parts can all be cut from ¾″ by 2½″ and ¾″ by 4″ stock. Face square and glue up so the joints will not come together. The height of the table is equal to the diameter of the outer edge of the circle and can be lowered or raised simply by changing the diameters, though 15″ will be found a good medium height for most modern tables. Probably, the maximum convenient height for this table would be about 17″, depending on length, while under no circumstances should it be lower than 13″.

Brace the ends with ¾″ by 1½″ by 7⅞″ boards rounded slightly on the outer edge and set in even with the circular pieces to assure a good, flush surface for the veneer. Glue in triangular corner blocks at top, center, and bottom, as shown in the drawing, splitting them from straight-grained stock 1″ square. Then set the frame upside down on the bench for ease in handling, and nail and glue on the bottom end strips. Try the legs with a carpenter's square to make sure they are true with the top, and clamp temporary braces on the outside from end to end to

Copyrighted material

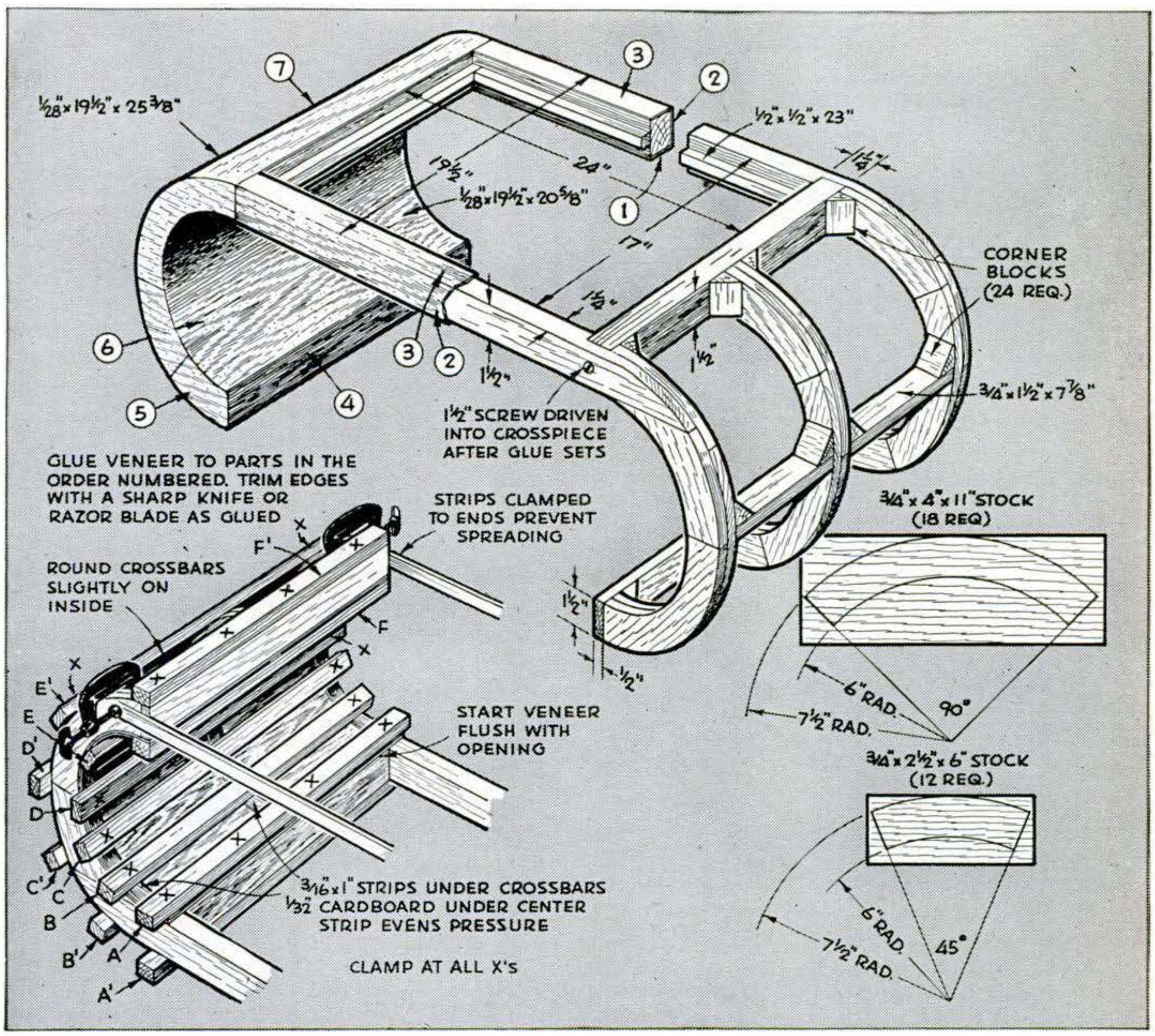
hold the assembly square while the veneering is being done.

Before cutting the veneer, make cardboard templates directly from the table and use them to check the measurements, especially those of the curved end sections, which will vary considerably if the radiuses of the arcs are changed. The pieces should be cut slightly oversize and trimmed flush as each is glued on in the order shown numbered in the drawing. Standard veneer of 1/28″ thickness is called for, but if the ends will be required to withstand considerable bumping, 1/16″ veneer may be obtained.

A method of applying and clamping the veneer sheets to the inside curves is shown in one drawing. After the glue has set, the clamps and crossbars are removed, and then the veneer is applied to the outside curves in exactly the same manner. Lay the sheets to be curved flat in water overnight, and then bend them around cylinders 12″ to 14″ in diameter, winding soft cord or tape loosely around them to hold them in place. They will be curved enough when thoroughly dry to go on the rounded frame.

Start the gluing by aligning one edge flush with the opening for the top of the table, place light strips at the edges and center, lay on crossbars *A* and *A'*, and clamp at four or more places, as indicated by the *X's*. Next, clamp on crossbars *B* and *B'*, and so on to the end. Be very careful not to press on any surface not supported by the frame as you work, or you will have hollows in the completed piece.

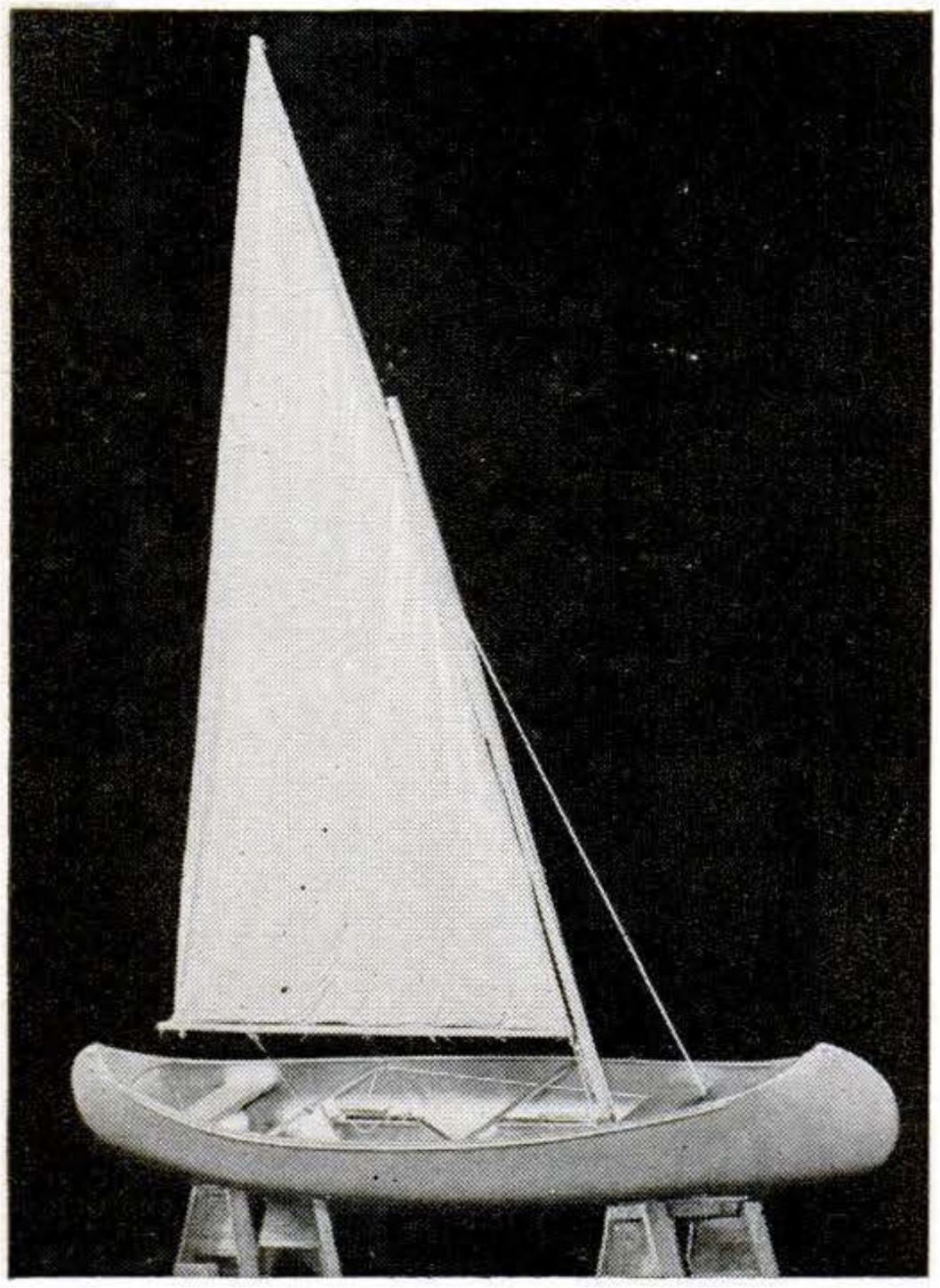
Four coats of wax, applied quite warm and rubbed in, will give a finish that not even alcohol will mar. After waxing, screw in ½″ by ½″ strips to support the glass flush with the top surface. They should not be waxed, since this would cause spotting.



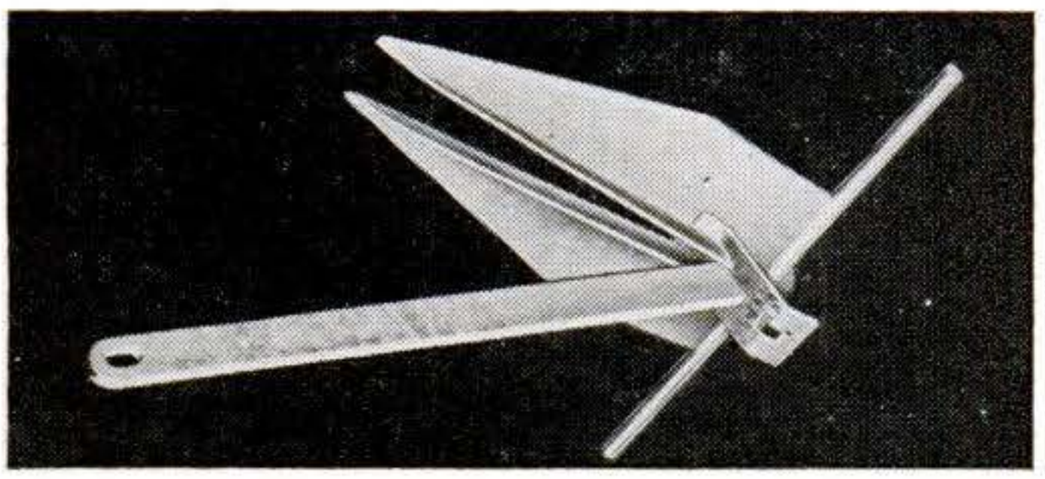
Legs are glued up from sections, with staggered joints. Apply veneer to the parts in the order numbered. Clamp the curved end veneers under crossbars, as at lower left, in the order indicated by the letters.

Copyrighted material

•FOR BOATS AND BOATING•



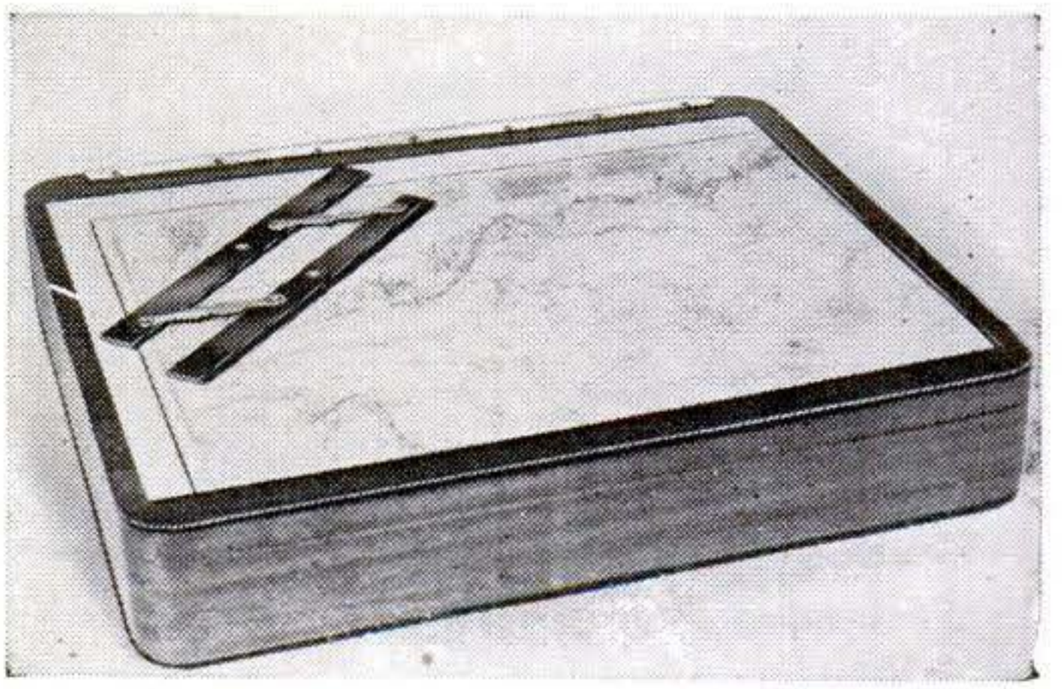
SAILING CANOE. An aluminum centerboard unit, with rudder and skeg assembly, gives stability to a 16′ aluminum sailing canoe made by the Rice Manufacturing Company, of East Boothbay, Me. Spars consist of mast, boom, and topsail club, all made of clear pine. The sail, which has an area of 42 sq. ft., can be lowered by a person seated by the rudder. With the mast removed, the canoe may be used for paddling in the usual way.



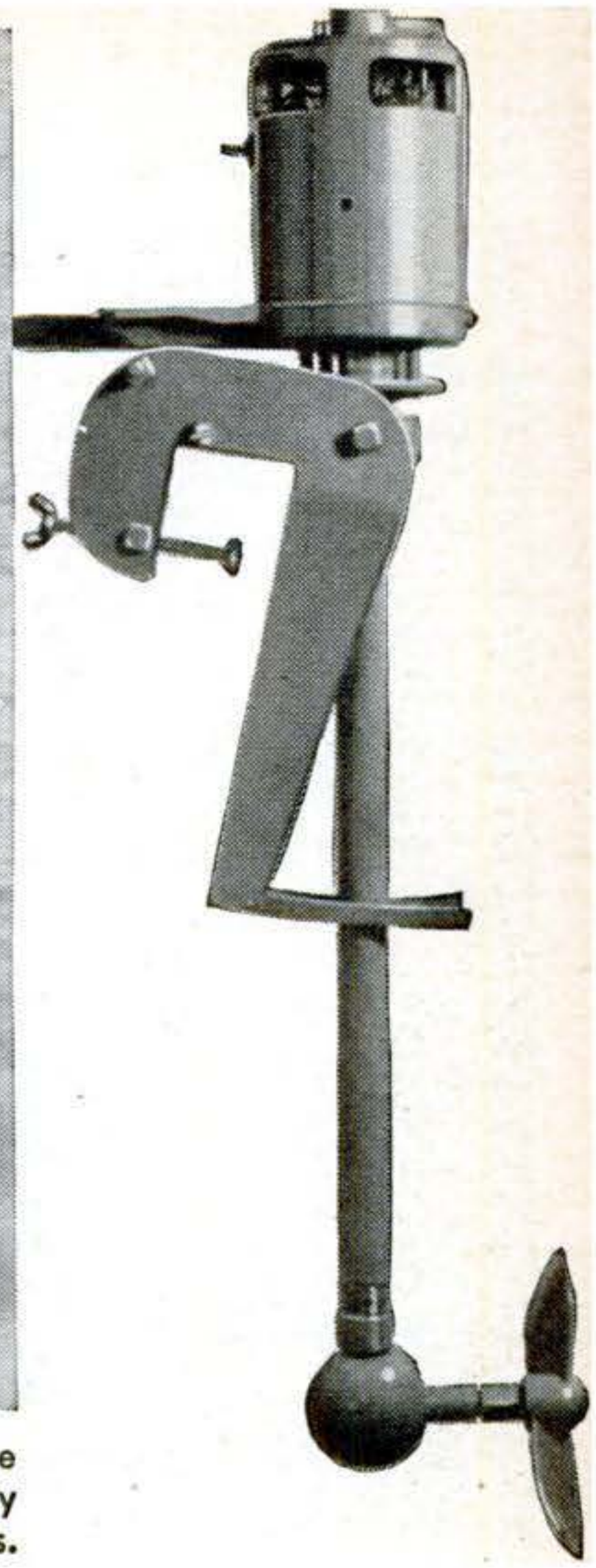
ROWBOAT ANCHOR. Pivoted flukes on this 4½-lb. anchor dig deeply into the bottom for a strong hold, and yet break out easily on a vertical pull. It is a product of Danforth Anchors, of Berkeley, Calif., and is priced at $3.50.

MILE DIAL. An instrument manufactured by the John E. Hand & Sons Co., of Haddonfield, N. J., gives a quick measurement of the distance between two points on a marine chart. When the instrument is run over a course laid out on a chart, the dial automatically registers the distance. Available either for nautical- or statute-mile charts, it is calibrated in the four scales most commonly used. It sells for $10.

CHART AND FRAME CASE. Yachtsmen who travel in confined waters have to check their navigation charts frequently even though this may mean unrolling and flattening many sheets. The Navy had charts taped between flat plastic holders, and now an adaptation of the Navy method is made available to civilian sailors by the Gillis and Guthrie Mfg. Co., of Branford, Conn. In the navigation gear pictured below, flat charts and instruments are stowed inside the mahogany case. The chart being used is slipped under the matte-finish plastic shield on top. Pencil markings on the plastic are easily erased.



Copyrighted material



A single battery drives a boat at trolling speed. Two in series give more speed but a shorter run per charge. Variable speed can be obtained by detachable clips put on various cell straps to give 6, 8, 10, or 12 volts.

Electric Outboard Stalks Fish

By Alfred J. Brosseau

IF YOU would enjoy the indolent luxury of gliding effortlessly over the water, or if you'd like to steal up on the fish in your favorite spot and troll as you go, you'll want to make this electric outboard. Powered by a three-brush generator that you can pick up at an auto wrecking yard, it will drive the average rowboat for hours on a battery charge. The unit is light and readily portable, while the battery can easily be kept in the trunk of a car. If an extra lead is run from the engine generator, this extra battery can be kept charged during ordinary operation of the car.

Since construction details will vary with the generator used, obtain it before building the rest of the unit. The generator shown is from a late Model-A Ford, but any three-brush generator can be used. The only electrical changes necessary consist of removing the adjustable (third) brush and connecting its lead (from the field winding) directly to the insulated terminal atop the housing. The generator will now run as a motor when connected to an ordinary 6-volt battery, and should draw 10 to 12 amp.

Cut off the threaded part of the shaft. Centerdrill the end of the shaft and drill ⅜" dia. to a depth of ¾". Drill a transverse 3/16" hole about ⅝" from the end, and saw down to the hole with a hacksaw to form a slot. The generator is mounted on a ¾" brass pipe flange by means of four bolts run through the end bell. A tiller made from steel bar stock with a wooden handle is attached by two screws.

The clamp that fits the boat transom consists of two pieces cut from 3/32" cold-rolled steel plate, bent as shown and connected by two steel spacers at the top and

Copyrighted material

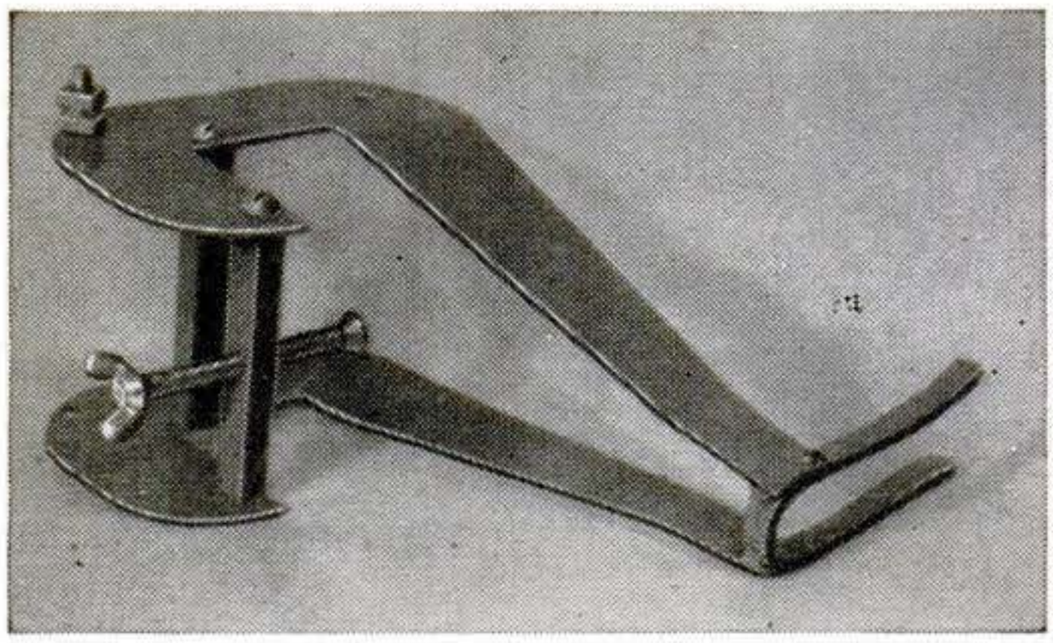
a strap yoke at the bottom. The spacers are tapped 5/16″-18 at each end to receive machine bolts. One spacer is also tapped for the transom clamp screw. This may be fitted with a crosspin as in the drawings, or with a pinned wing nut as in the photos.

For the gearbox housing, procure a ⅞″ length of 2½″ O.D. brass tubing with a ¼″ wall, or turn a piece to these dimensions from round brass. Care should be taken to drill the two ⅝″ holes for the propeller shaft perfectly in line, preferably by drilling undersize and running a ⅝″ reamer through.

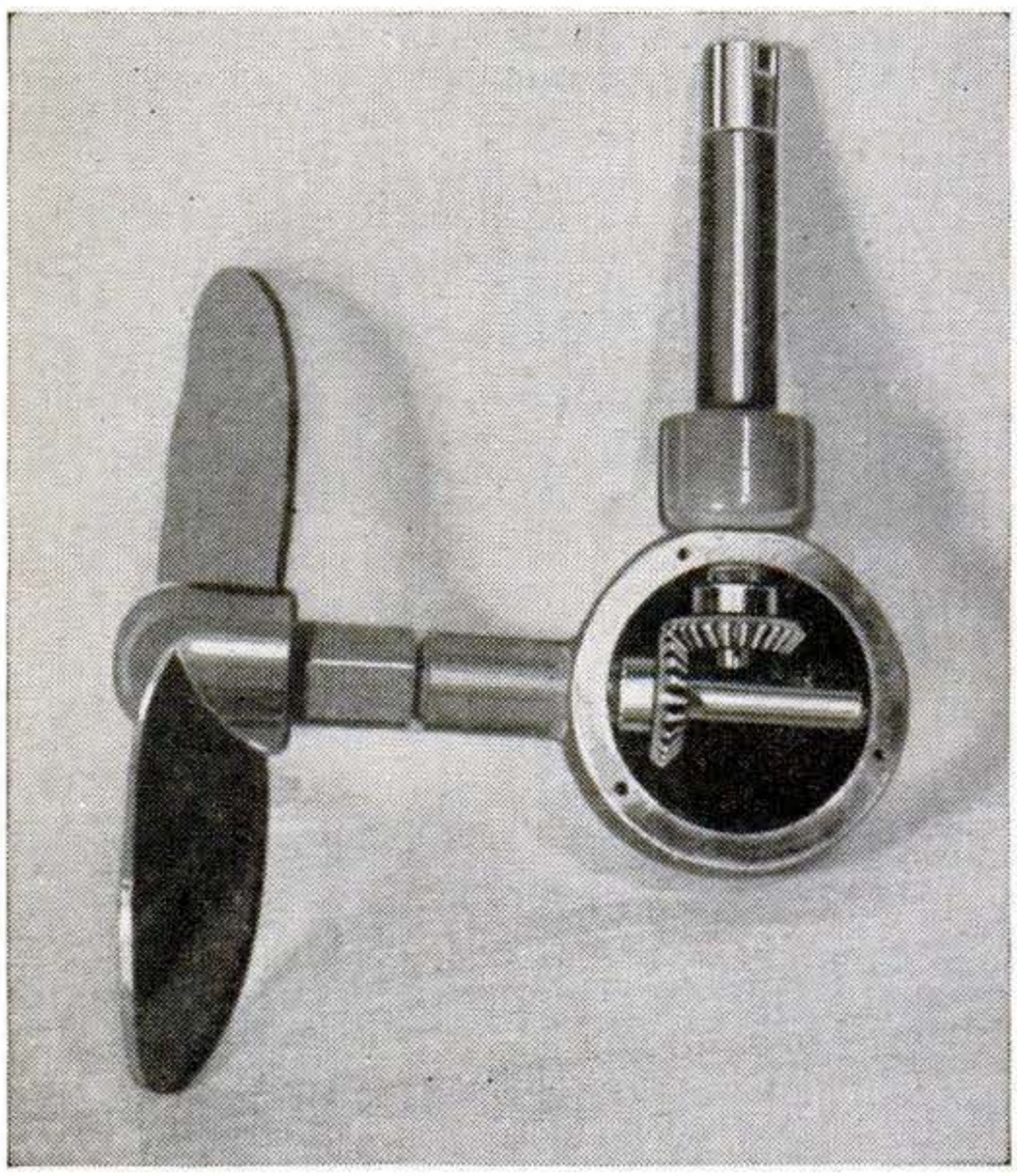
A ¾″ brass pipe cap is drilled through to receive the lower bearing of the vertical shaft, and the two pieces are silver-soldered to the gearbox. The propeller bearing, turned and threaded as shown, is also silver-soldered in place. Take pains to get accurate alignment with the opposite hole. The threaded end of the bearing is counterbored 7/16″ to provide space for graphite cord packing around the shaft, which is held by the gland nut.

The ball bearing should be one designed for thrust as well as radial load, and a light press fit in the ⅝″ hole. It is retained by a recessed brass disk, silver-soldered in.

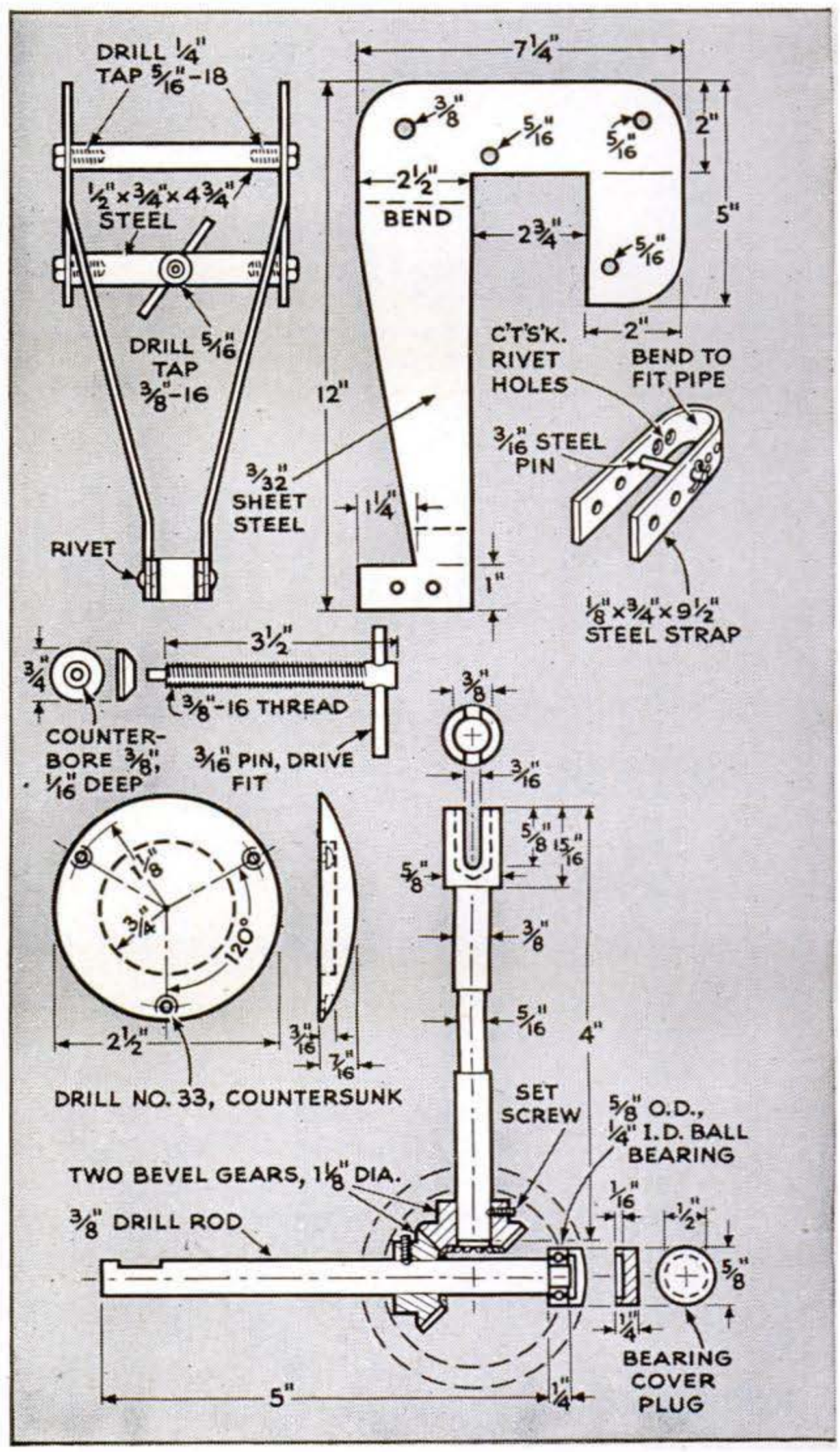
The propeller shaft is provided with a flat for the propeller setscrew and is shouldered to a tight fit in the inner ball-bearing race. The short vertical shaft, turned from ⅝″ stock, is slotted at the upper end like the generator shaft. Two gear covers are turned from 7/16″ brass, drilled for three screws, and used to spot tapped holes in



To adjust the shaft angle for horizontal propeller thrust on a slanting transom, a pin or bolt is put through the right holes in the U-shaped yoke.



Brass or bronze, easily machined and silver-soldered, should be used for all underwater parts but the shafts, which ideally might be stainless steel.



Copyrighted material

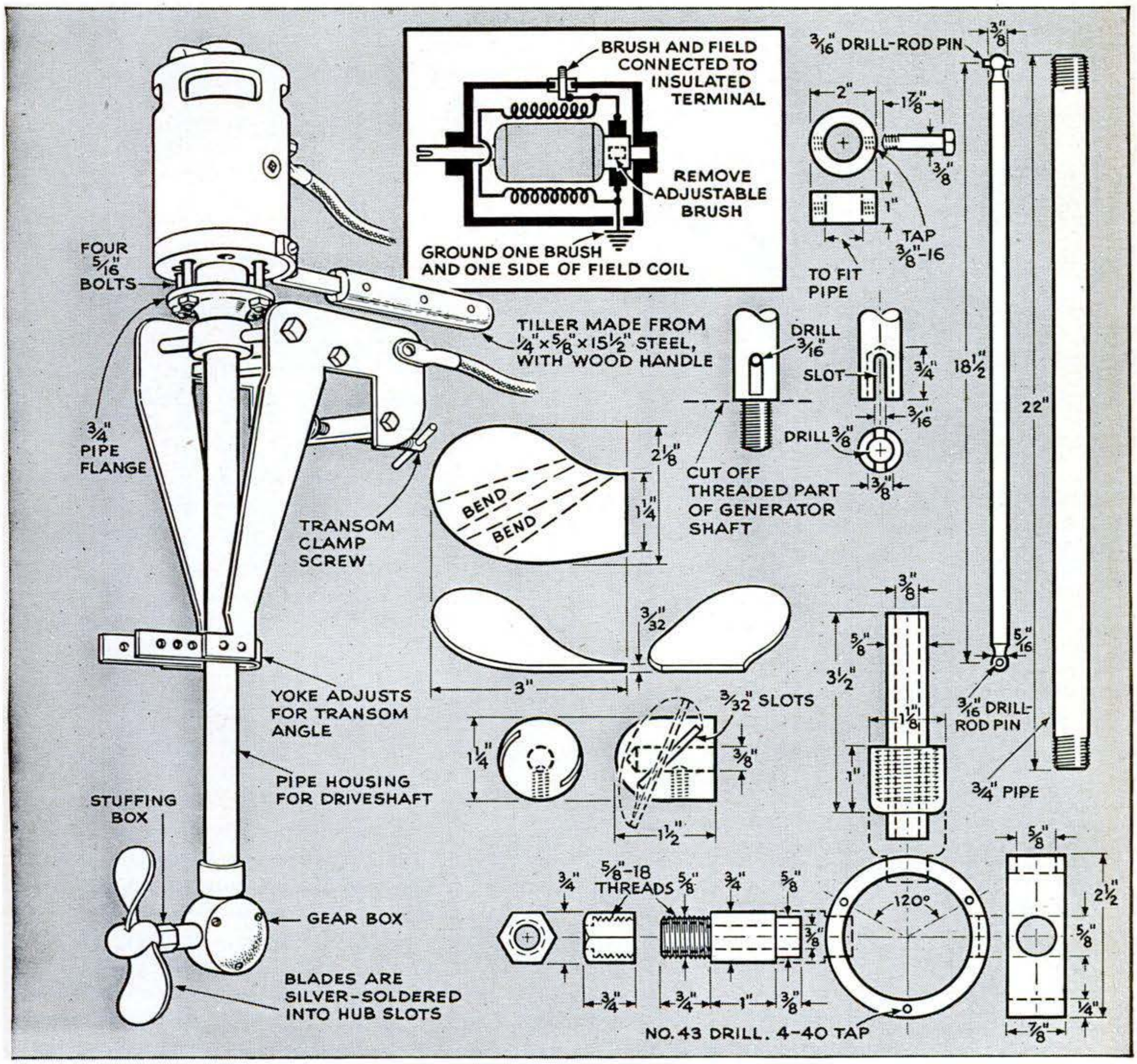
the housing. Cut paper gaskets to fit them.

The ¾″ floor flange to which the motor is bolted rests on a collar provided with two transverse ⅜″-16 holes to receive the pivot bolts. The long vertical shaft, a piece of ⅜″ drill rod turned to a ball at each end and fitted with two crosspins at right angles to each other, and a 22″ length of ¾″ brass pipe complete the drive assembly.

Insert the propeller shaft in the gearbox, sliding it through the gear and into the ball bearing. Holding the second bevel gear in place, slide in the short vertical shaft and tighten the gear on it. Use thin brass or bronze washers between the lower gear and the sleeve bearing, and under the ⅝″ shoulder of the vertical shaft, to adjust gear mesh; they should have just sufficient backlash to indicate that they are meshing freely. Pack the case with gear grease and fasten the covers in place. Also pack the ¾″ pipe with grease and thread it into the lower socket, slip it through the pivot collar, and screw it into the motor flange. Then screw the pivot bolts in place.

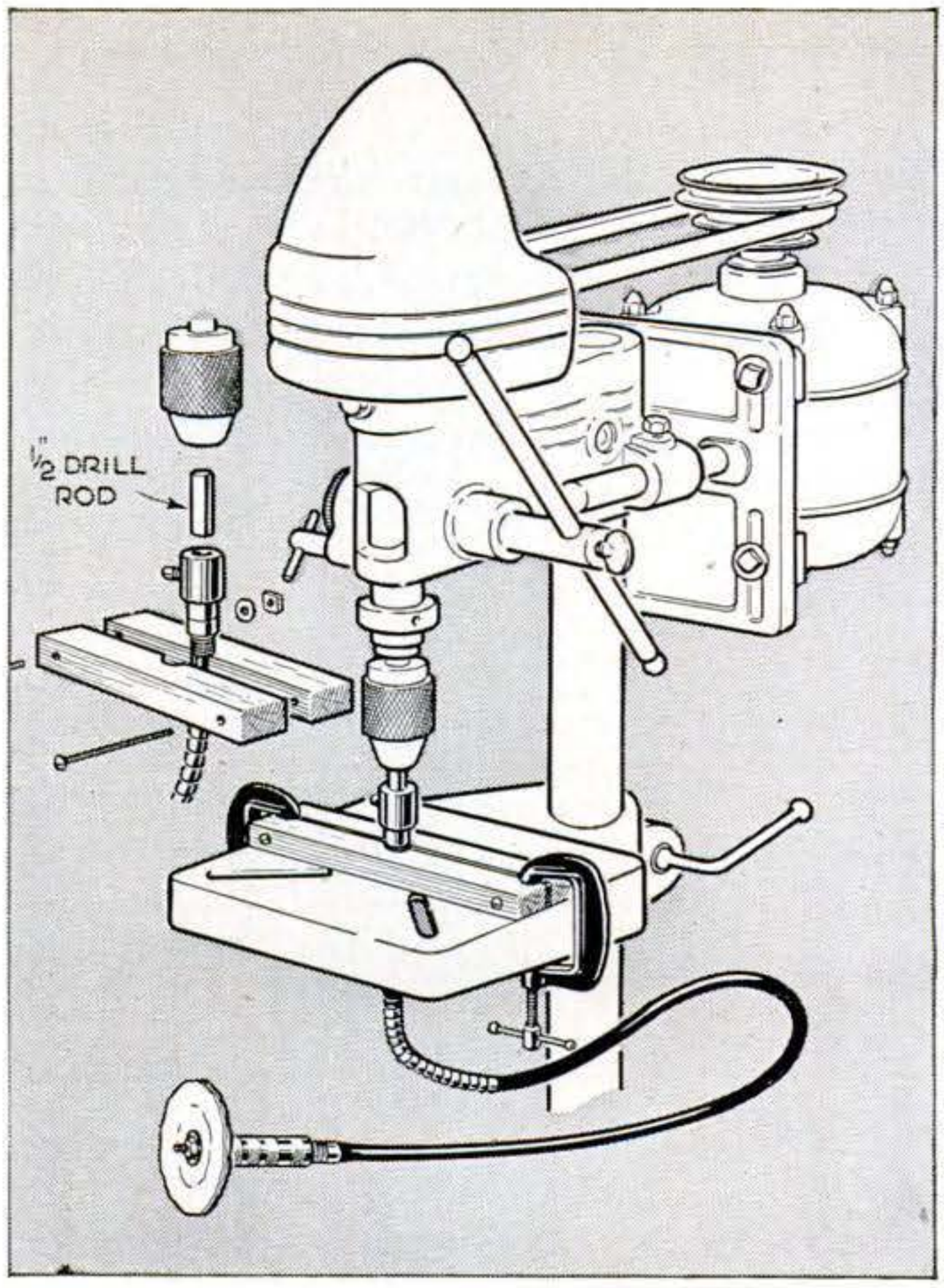
A propeller is made by turning a 1¼″ hub, sawing two slots at 45 deg., and silver-soldering in two blades cut from 3/32″ sheet brass. If you prefer, buy a ready-made one designed for use on very small gasoline outboards.

Fairly heavy cables, say No. 12, should be used from the battery, and if a switch is used, it should be a heavy-duty type. Should the motor run the wrong way, reverse by transposing the field leads. END

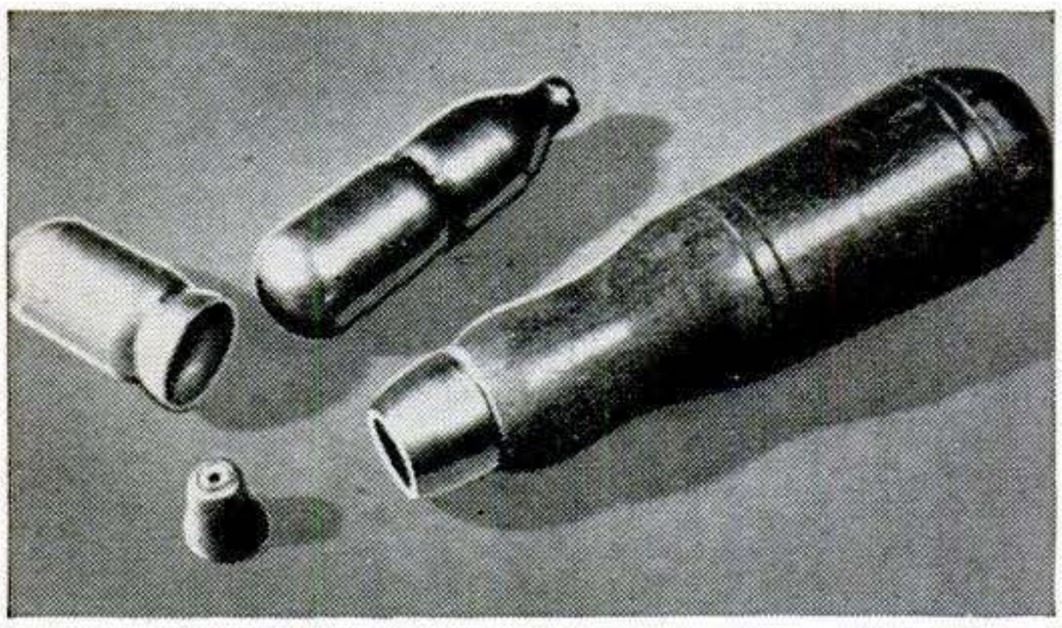


Copyrighted material

NEW SHOP IDEAS

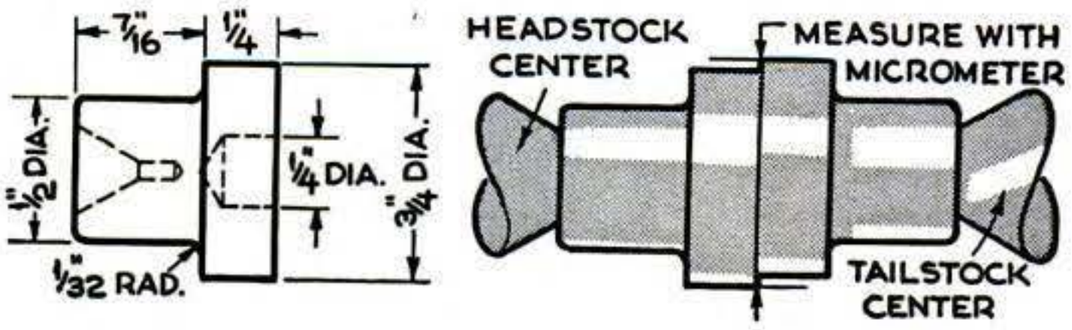


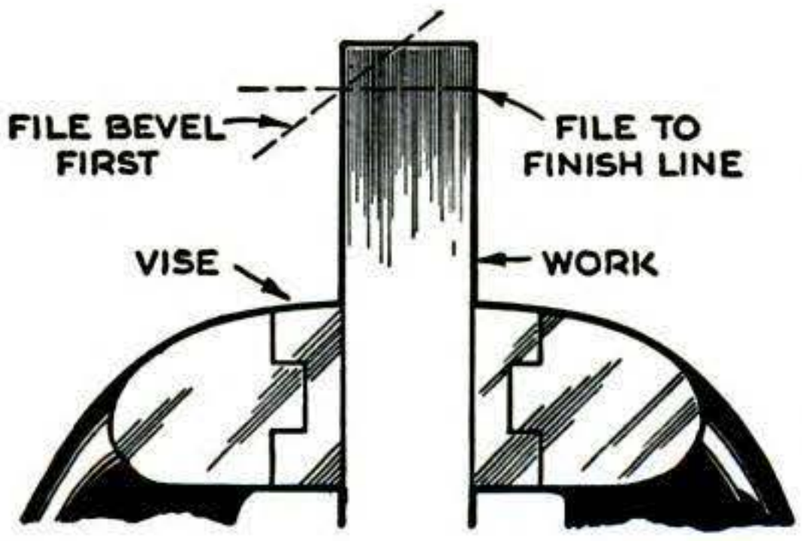
DRILL RUNS FLEXIBLE SHAFT. Two wooden clamp blocks convert a drill press into a multispeed power source for a flexible-shaft tool. A stub of ½" drill rod or shafting acts as a coupling between the chuck and the driving end of the flexible shaft. To make the clamp blocks, take a piece of hardwood as long as the drill-press table is wide, drill two holes through at 90 deg. to the face for the clamping bolts, and bore a hole through the face for the flexible-shaft collar. Then cut the piece in half and assemble around the shaft. For minimum whip and vibration, line up the blocks carefully before clamping them to the table. The drill-press quill is, of course, locked in a low position during operation.—RALPH S. WILKES.



FERRULE CUT FROM SODA BULB. Hacksawed into appropriate lengths, an empty carbon dioxide cartridge of the kind used with home soda-water bottles will give you two to three ferrules for homemade tool handles. Shape and smooth the ends with a file, and polish with fine emery cloth. Be sure the gas has been discharged before attempting to saw.—WILL THOMAS.

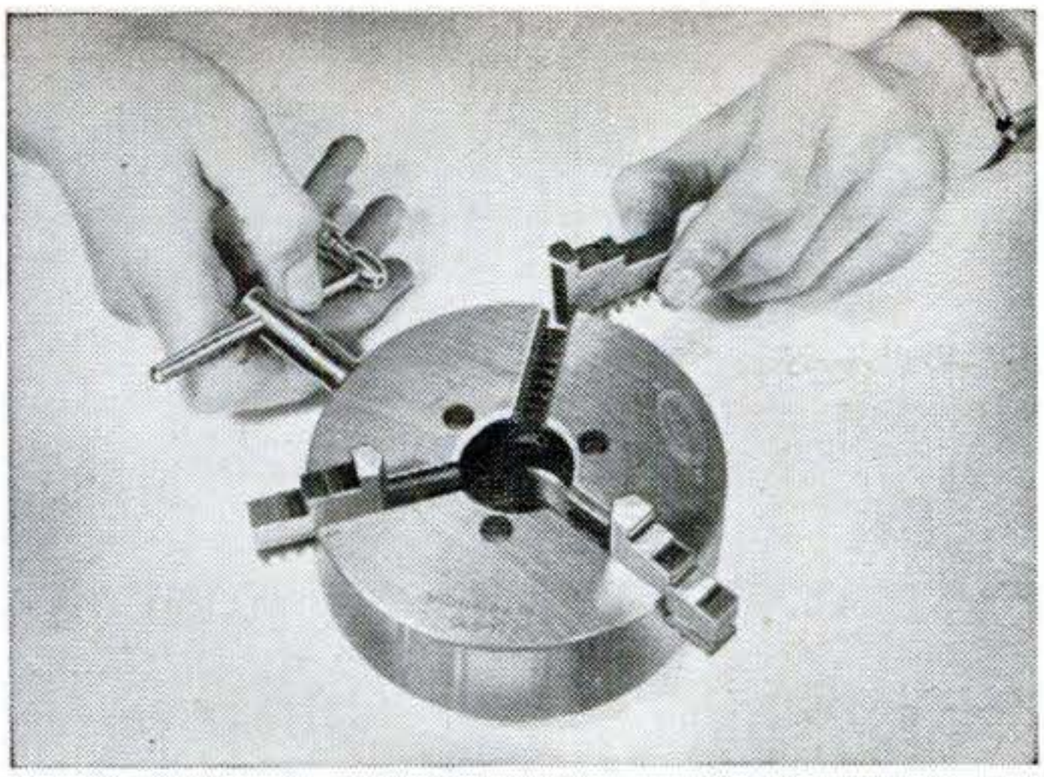
TAILSTOCK REALIGNER. Quick, accurate realignment of a tailstock after taper turning is easy with this device, which consists of two identical parts turned from cold-rolled steel. The two pieces are made as one, with the center section turned to a definite dimension, say .750". After parting, each piece is chucked, indicated, drilled to relieve the centers, and faced. The face of each part must be square with its axis. In use, the parts are inserted firmly between centers and "miked" as shown. Any misalignment of the tailstock is revealed as a reading higher than .750".—G. TAYLOR.



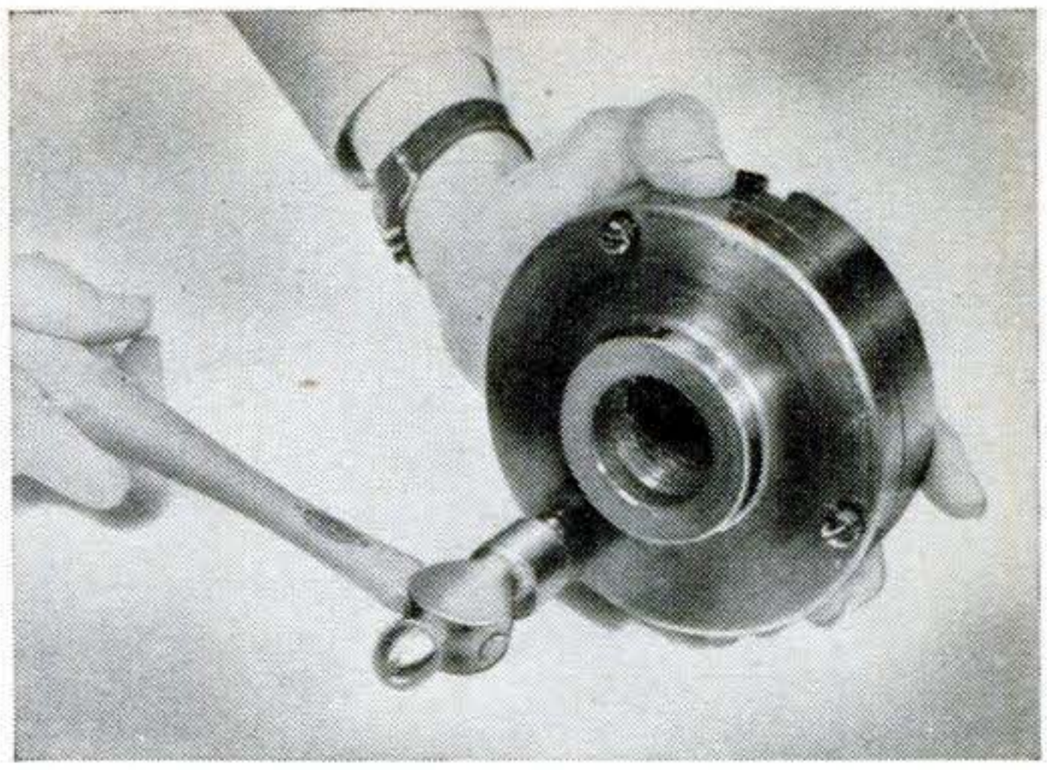


FILING TO A LINE. When you have to shorten a piece to a scribed finish line, first file a bevel on the marked side to the finish line, and then file down squarely to the base of the bevel. In this way the amount of material to be removed can be accurately controlled, and there will be less danger of taking off too much stock. On fairly thick pieces, it may be advantageous to file bevels on both sides before starting to file through the middle.—H. FOSTER GRISWOLD.

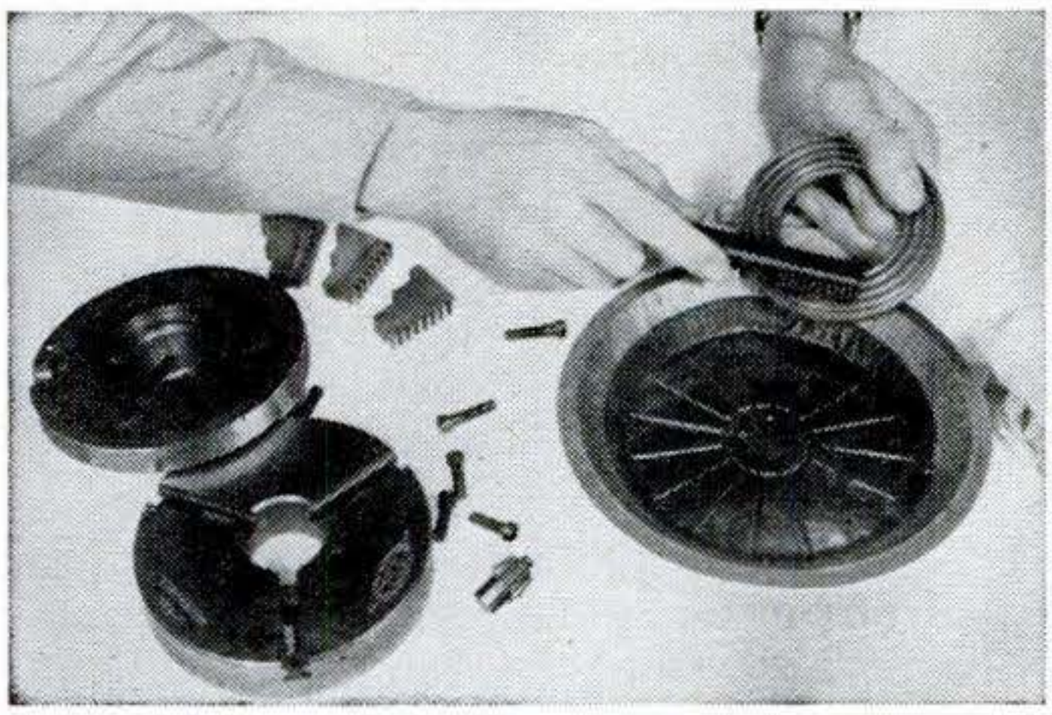
Copyrighted material



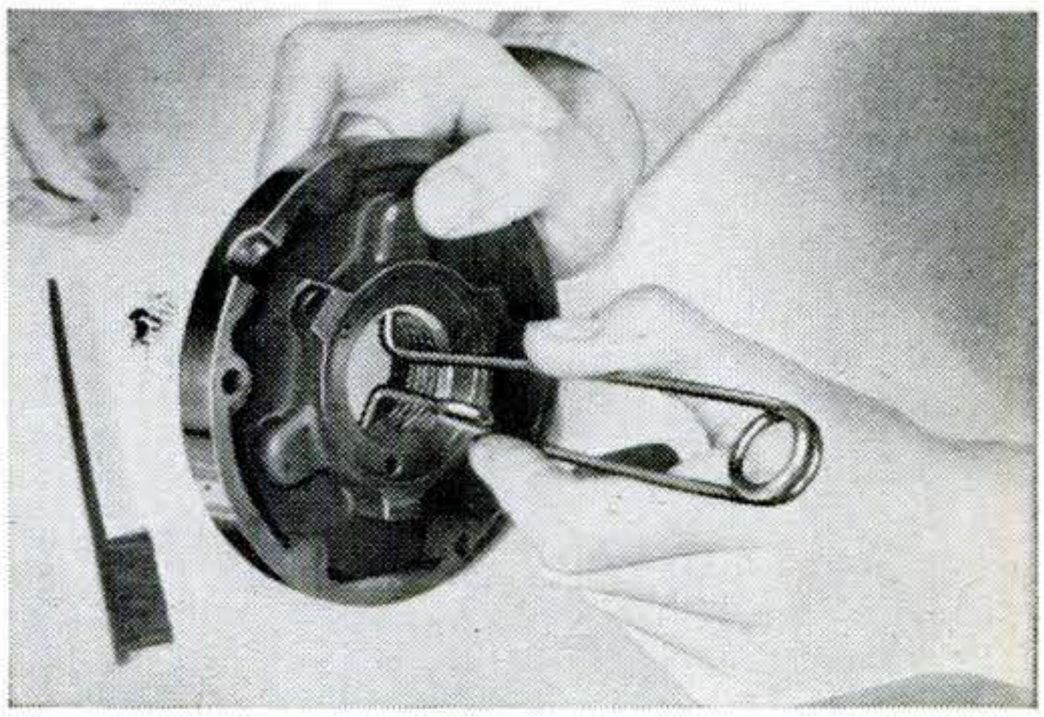
1 To dismantle a lathe chuck for cleaning, take out the jaws first and then the body screws.



2 Replace the screws on one side with slightly longer bolts. Tap them to release the parts.

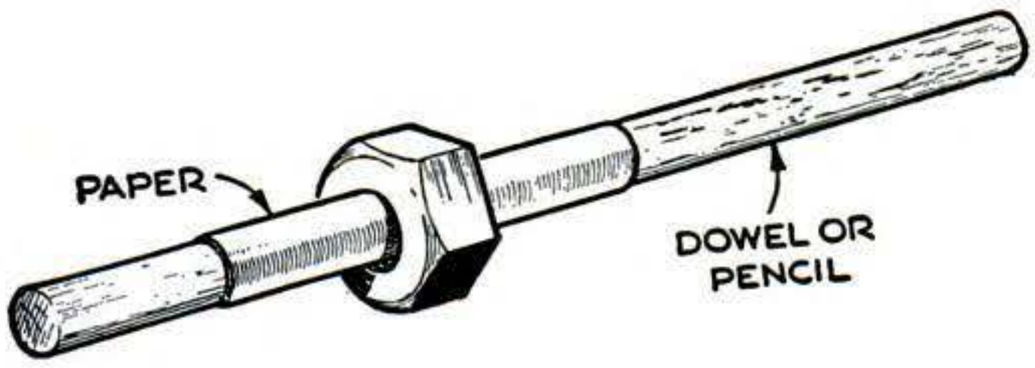


3 Clean in kerosene to remove old oil and chips, and use a wire brush to get out gummy deposit.

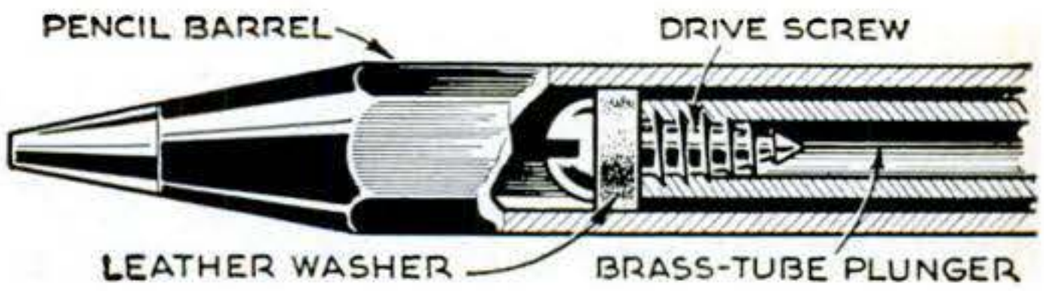


4 To assure accurate alignment when the chuck is on the spindle, threads must be free of chips.

HOW TO CLEAN A SCROLL CHUCK. Besides getting a periodic oiling, a universal chuck must be kept clean to prevent undue wear and loss of accuracy. Some dirt and chips can be removed from the outside, but the chuck should be dismantled for a thorough job as soon as the jaws tend to bind or stick. Replace the body screws on one side with bolts that will project ¼" when tightened, and hold the chuck in one hand when tapping these bolts to separate the other parts. After cleaning, sparingly oil the scroll bearings and other contact points with light motor oil. When reassembling, draw the body halves together by tightening the screws evenly.—RICHARD HANSCOM.

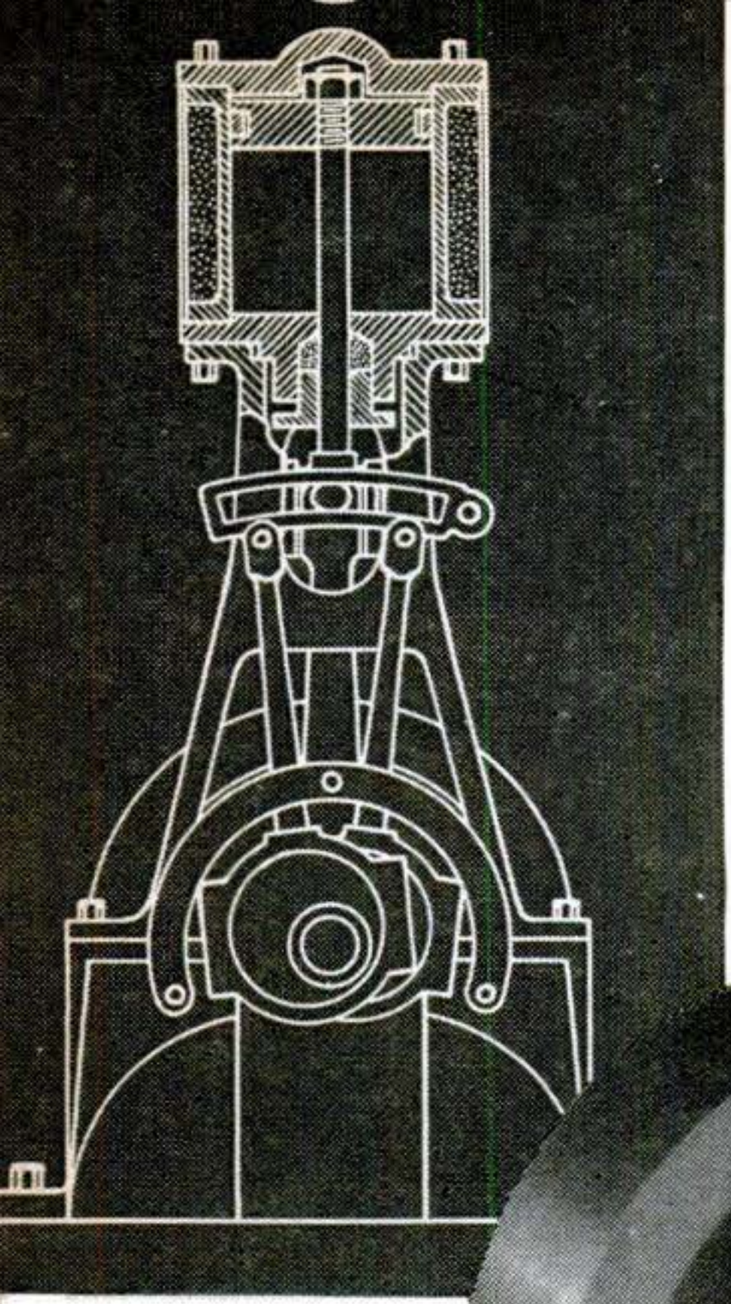


COUNTING THREADS IN A NUT. If you lack a thread gauge, an impression of the threads can be taken on a piece of paper inserted in a nut and twisted slightly with a finger, dowel, or pencil. A little oil rubbed on new threads will make the impression clearer. When the paper is taken out, the threads can be counted with the aid of a scale.—ROBERT FLYNN.



PENCIL GREASES MODELS. An old mechanical pencil with the inner parts removed can be made into a good grease gun for lubricating small machines and models. Make a plunger out of a brass tube with a leather washer screwed to the end. Fill the barrel with light grease or petroleum jelly, insert the plunger, and force grease out at the nozzle.—RALPH K. MENSING.

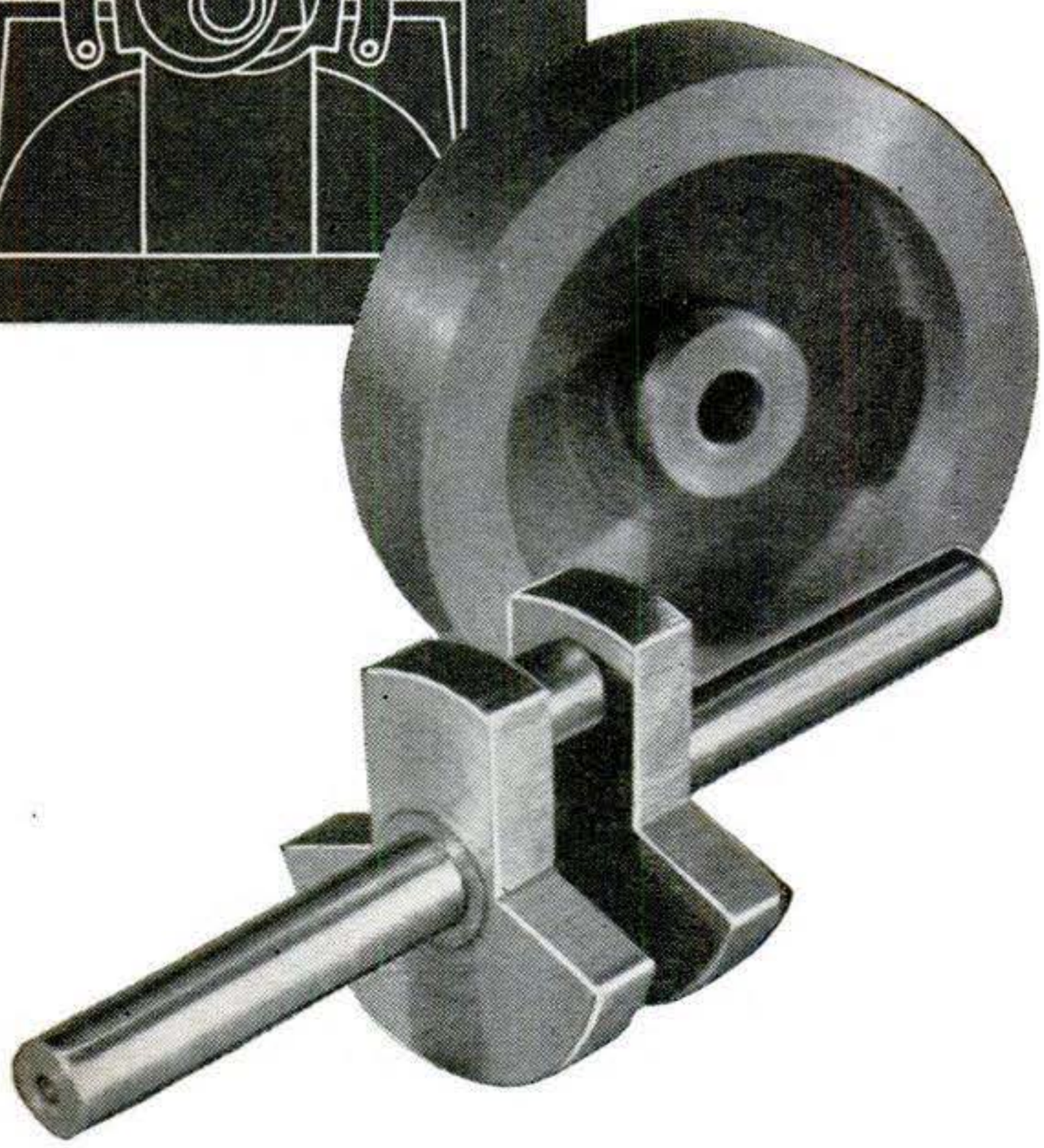
Copyrighted material



Vertical Steam Engine with Reverse Gear PART THREE

Making the

By C. W. Woodson

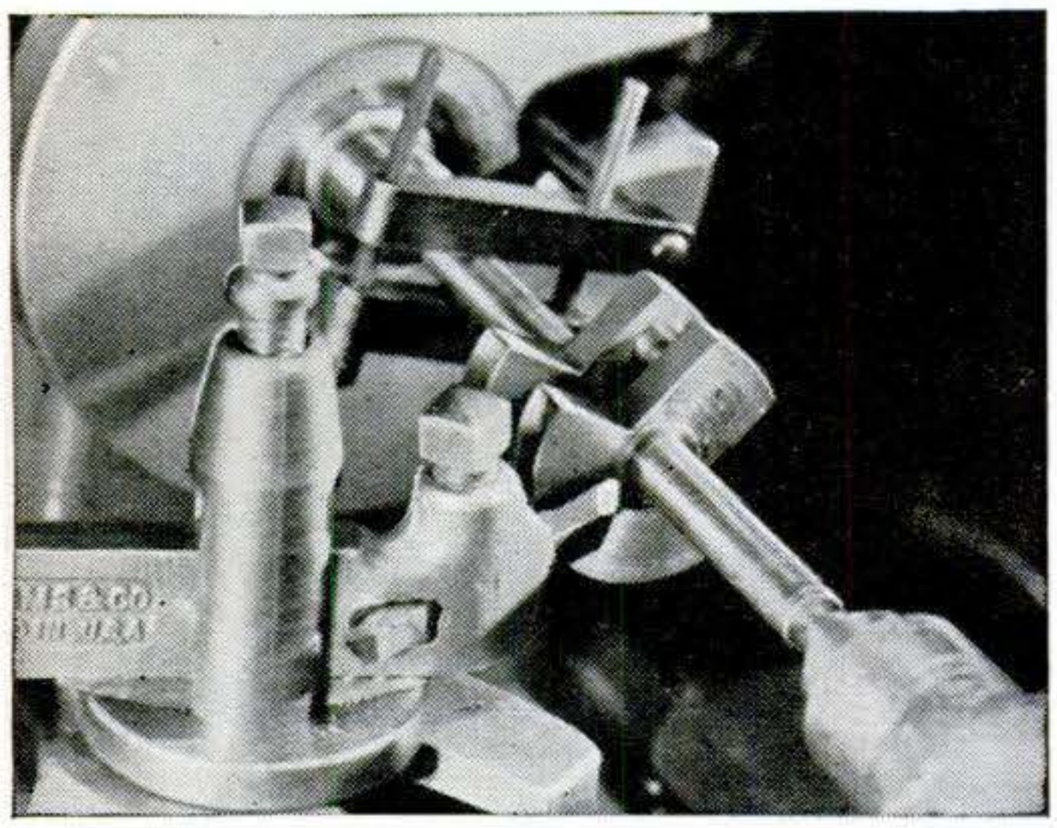


Alignment of the two ends of the shaft is assured if it is made as one piece and cut when pinned in place. The flywheel is turned from a casting.

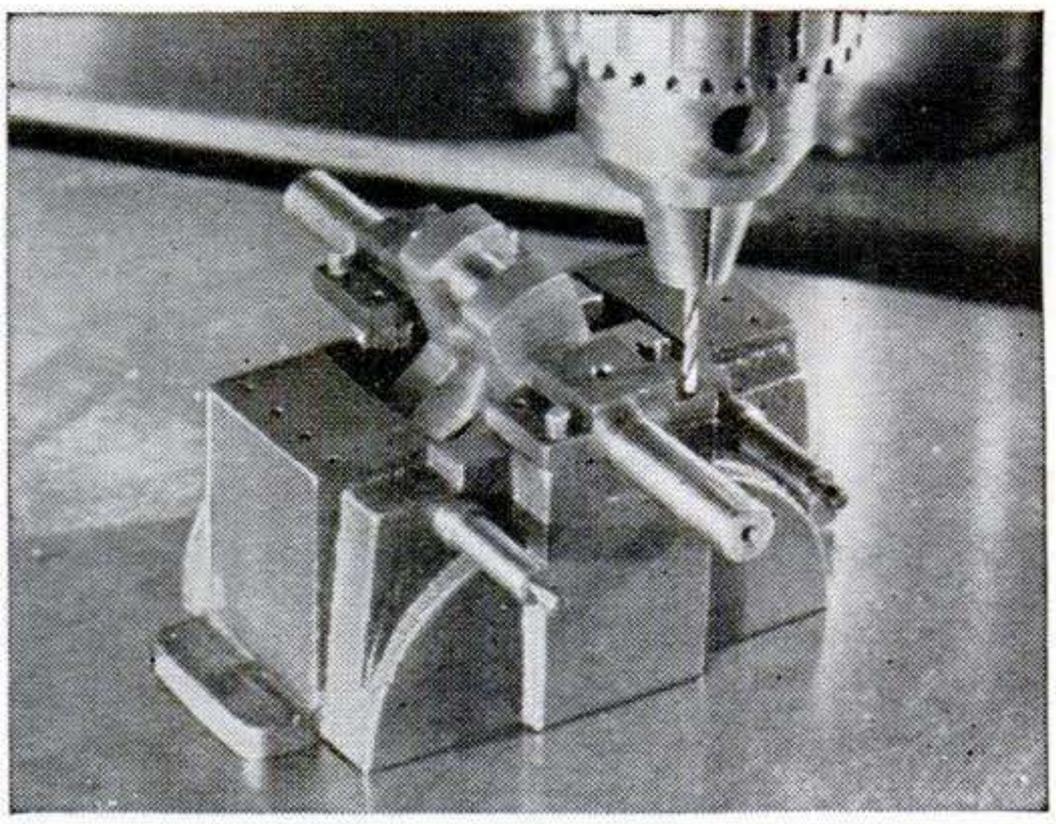
AN ACCURATE, true-running crankshaft is necessary if the model steam engine is to work freely and use steam with maximum efficiency. This part is assembled from a shaft, two webs, each with an integral counterbalance, and a crankpin. All are made up from solid steel stock, the webs cut with a hacksaw and filed to shape from two 5/16″ disks and the shaft and pin cut from drill rod.

Clamp the webs together and drill them at the same time for a drive fit on the shaft and pin. Because the shaft is cut as one piece 4⅞″ long and must be driven a considerable distance, it may be necessary to ream the ⅜″ holes for it slightly. Press both webs on the crankpin first. Next, with a block between the webs to prevent bending the pin, drive the crankshaft through. Then drill and pin all parts. Pieces of bicycle spoke make good pins.

The assembled crankshaft is next mounted between centers in the lathe and with the block still between the webs. Face the outer web sides smooth, form the 1/32″ collars, and turn the outer rim of the balance weights and the ends of the webs smooth and to exact diameter. Finally cut out the part of the crankshaft between the webs and file the inner faces smooth. Key-



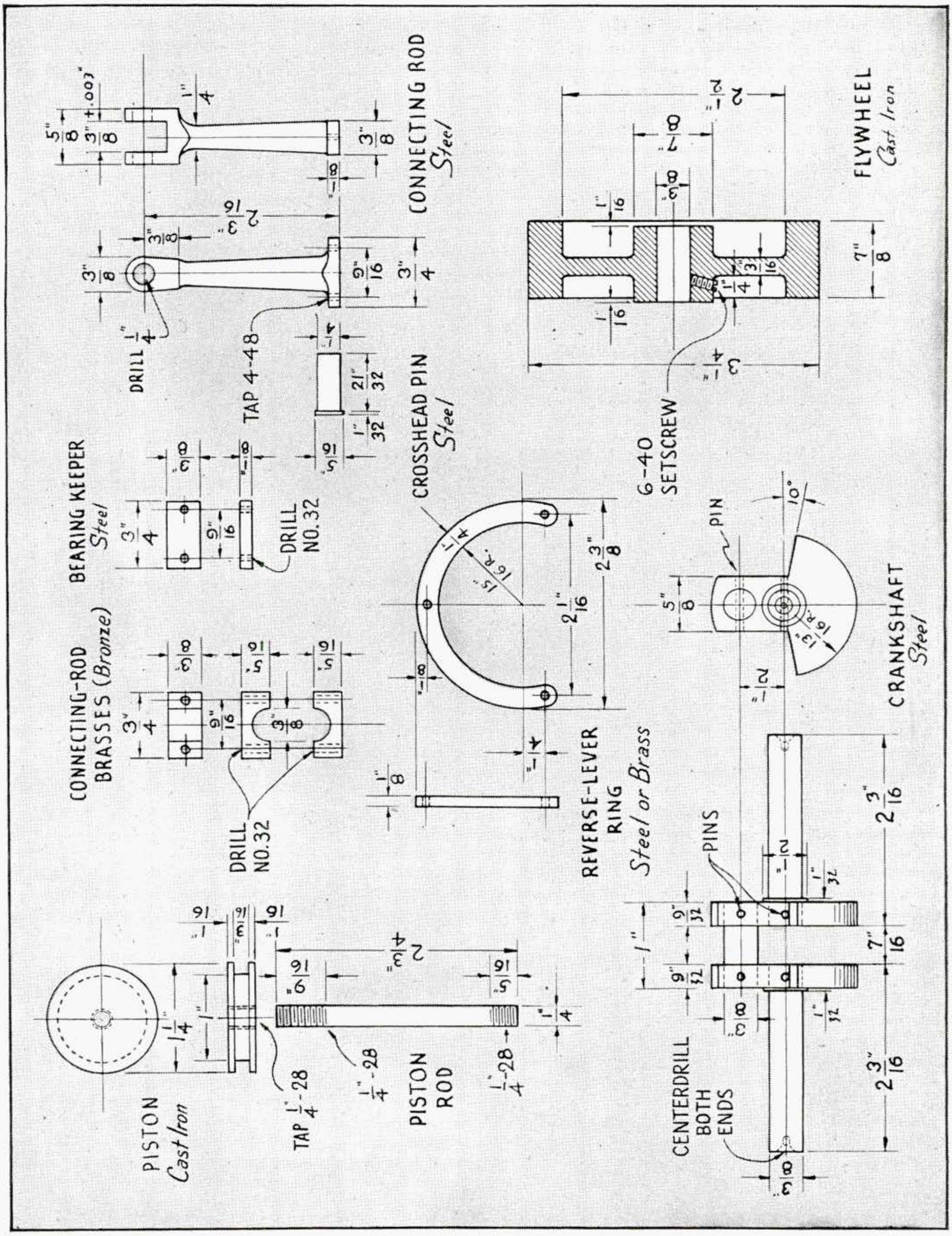
Mounted between centers, the crankshaft is faced smooth on the webs and the collar turned. A block between the webs prevents distortion.



Holes for the bearing bolts are drilled through the bearing caps while the crankshaft is in place to assure alignment of the bearing halves.

Copyrighted material

Crankshaft and Running Gear



All dimensions for the crankshaft, flywheel, connecting rod, piston, and piston rod are shown in the drawing. The reverse-lever ring is also shown and may well be made at this time.

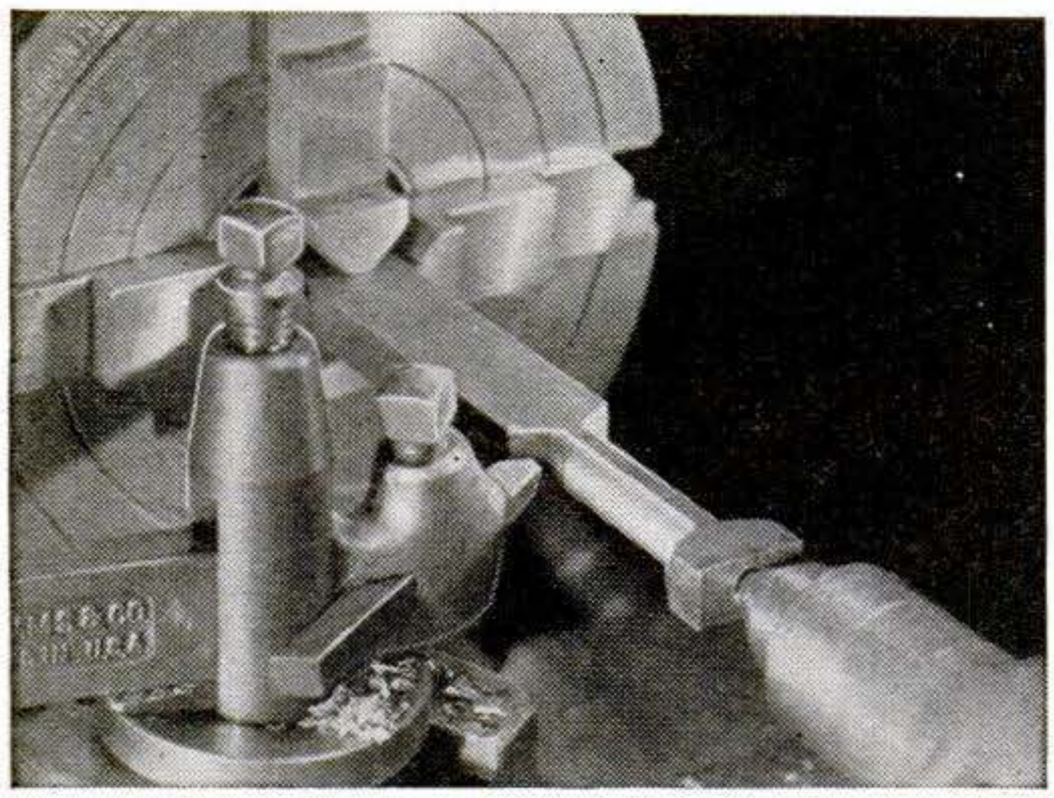
ways or setscrew flats are optional, depending on the use the engine is meant for.

Fit the finished crankshaft into the bearings next, clamp on the bearing caps, and rotate the shaft to make sure it turns freely. There should be no binding, since shaft alignment is insured when the webs are pinned before cutting out the center portion. With the shaft in place, drill and tap the bearing holes and bolt both caps down.

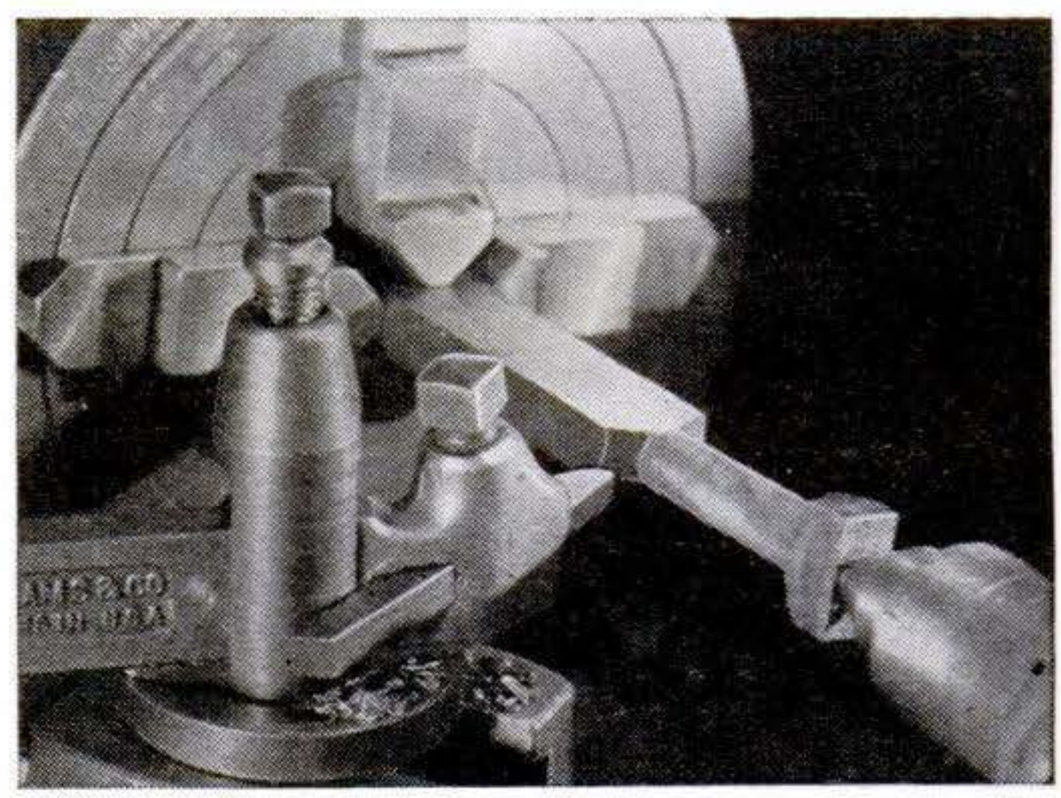
The connecting rod is rough-turned to shape from ⅜″ by ¾″ steel bar in the four-jaw chuck. It is removed and heated to a bright red, and the small end is twisted 90 deg. This can be done with a heavy wrench while the work is held in the vise. Then the piece is rechucked, its tapered section turned to shape and polished bright, and the work cut off. Drill, saw, and file the forked end to shape, and drill for the connecting-rod pin. Turn the pin to a force fit in the fork or thread it for a retaining nut.

Make up the connecting-rod brasses from flat bar bronze stock and the connecting-rod keeper from steel. Cut to length and drill for the screws that hold them to the connecting rod. Drill and tap the end of the rod and with two 4-48 steel screws assemble brasses and keeper on the rod. The crankpin hole is then drilled and reamed through the bearing brasses, and the end assembly is filed accurately to size.

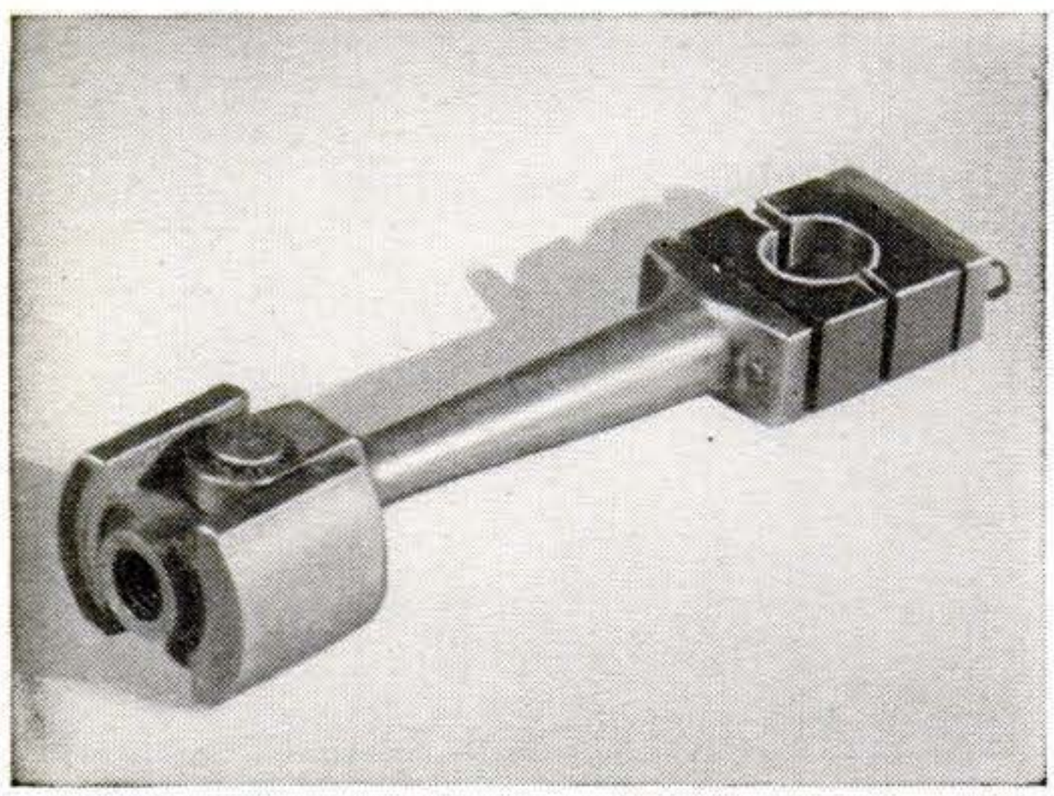
Centerdrill a 2¾″ length of drill rod for the piston rod, thread both ends, and screw it into a hole drilled and tapped in a rough piston blank made from a ⅜″ steel disk. Mount the work between centers and face both sides of the piston so it will run dead true. Then turn it to a nice sliding fit in the cylinder bore and cut the groove to width and depth for the piston ring. This ring, being a standard size, can be purchased, though one can be made up in the lathe from a short bar of cast iron if the



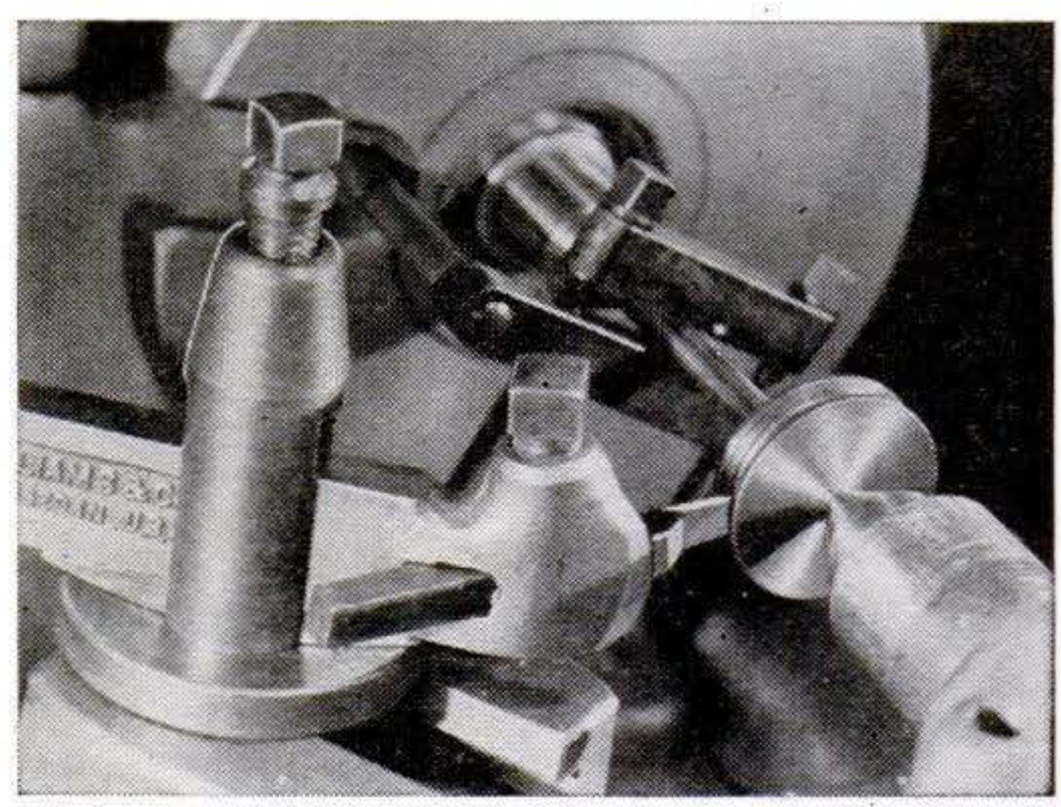
Steel bar stock is rough-turned to shape for the connecting rod, removed from the lathe, heated a bright red, and the small end twisted 90 deg.



Back in the four-jaw chuck, the connecting rod is turned for the taper, which is polished bright, and the piece is then cut off to length.



This is the connecting-rod assembly. The brasses are drilled and reamed while screwed together to give a nice running fit on the ⅜″ crankpin.



The piston is turned from a blank that has been drilled, tapped, and screwed to the piston rod. It is faced true, turned to size, and grooved.

Copyrighted material

modelmaker is experienced in ring turning.

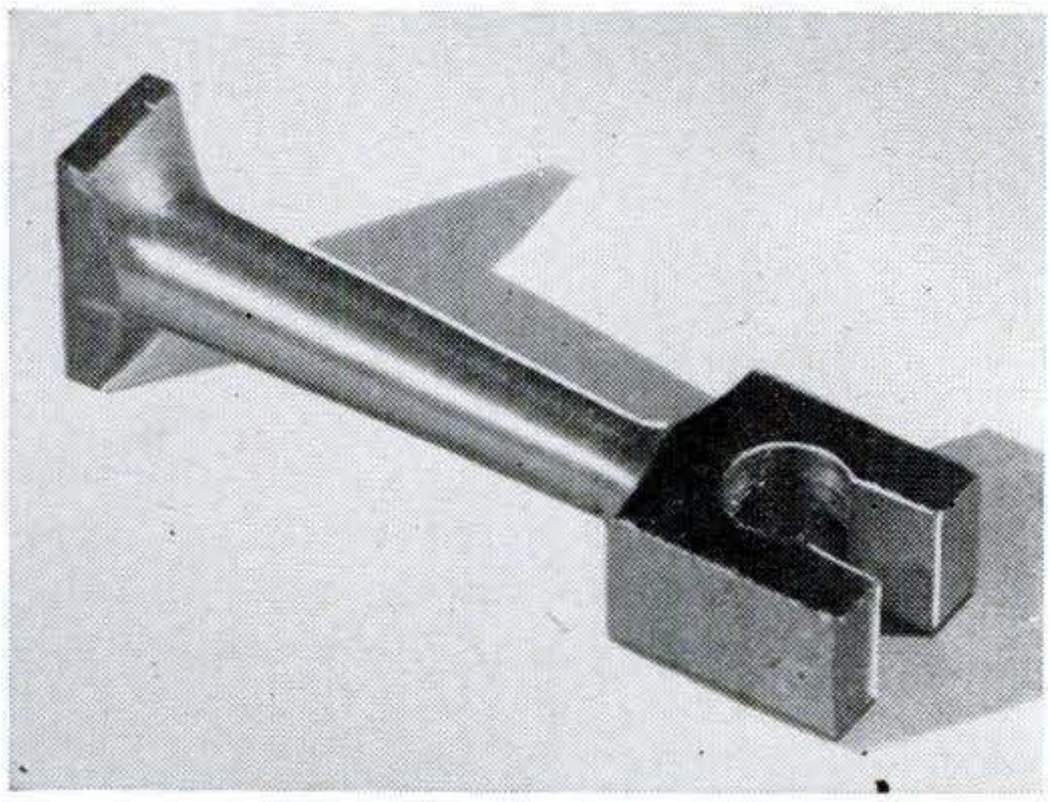
Enough of the parts will now have been completed so that you can make a trial assembly and test the piston travel. Assemble the base, the column or standard, the bottom cylinder cover, the cylinder itself, the piston and piston rod, and the connecting rod. Leave off the top cylinder cover so the movement of the piston can be checked. Likewise it will be unnecessary to put in the glands for the test.

If the machining has been accurately done, the assembled engine should work freely when the crankshaft is turned. Note carefully the travel of the piston, which should be the same distance from the top and bottom of the cylinder, clearing at both points by 1/32″. If it should hit at the bottom, the piston rod can be turned a little further out of the crosshead. Place the top cover on the cylinder and again move the piston through its travel. Any binding at the top will indicate that the piston is striking there, and a shortening of the piston rod will be necessary.

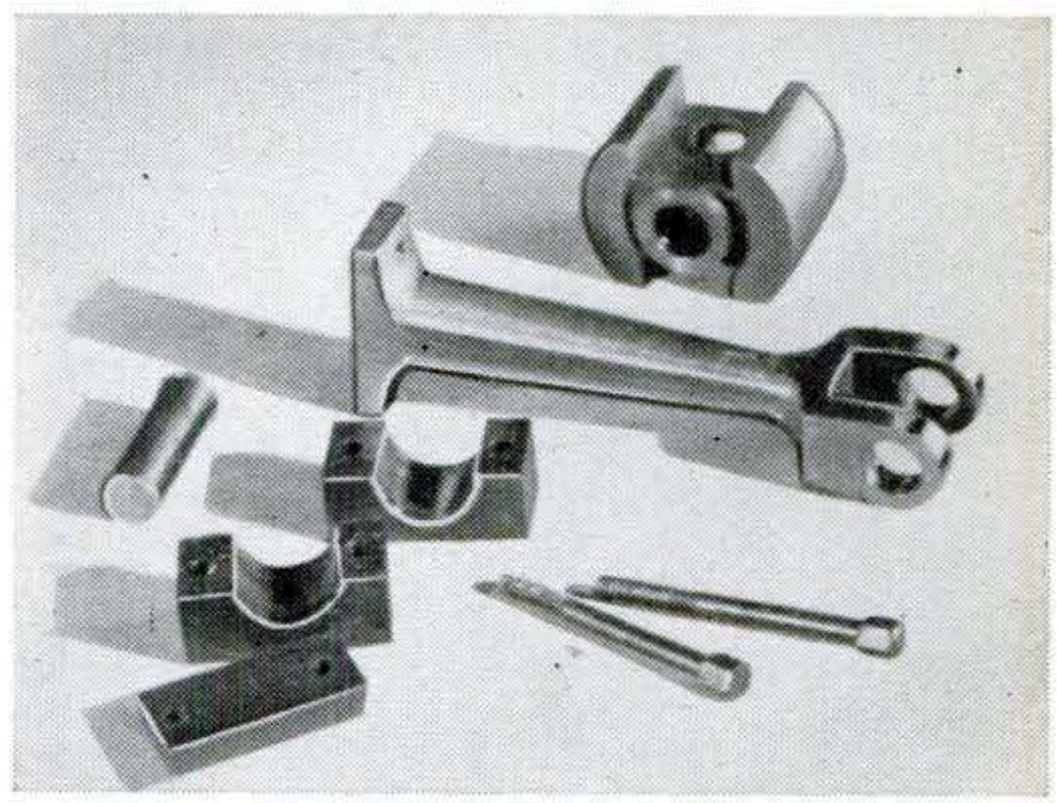
The reverse-lever ring is a section of a circle turned from a square piece of ⅛″ steel plate. It is first chucked in the four-jaw chuck, where the center is bored to size. Rechucked in the three-jaw with the expanding jaws gripping inside the hole, it is brought to proper outside diameter. A section of the ring is next cut out, and the holes are drilled for mounting the part on the engine base.

After so much work on bar stock, machining the flywheel will be a pleasant relief. This is made from a fine gray-iron casting. It is rough-turned to size in the three-jaw chuck, and the shaft hole is then drilled and reamed. The work is next mounted on a mandrel held between centers, and the hub, edges, and inside of the rim are faced to run dead true.

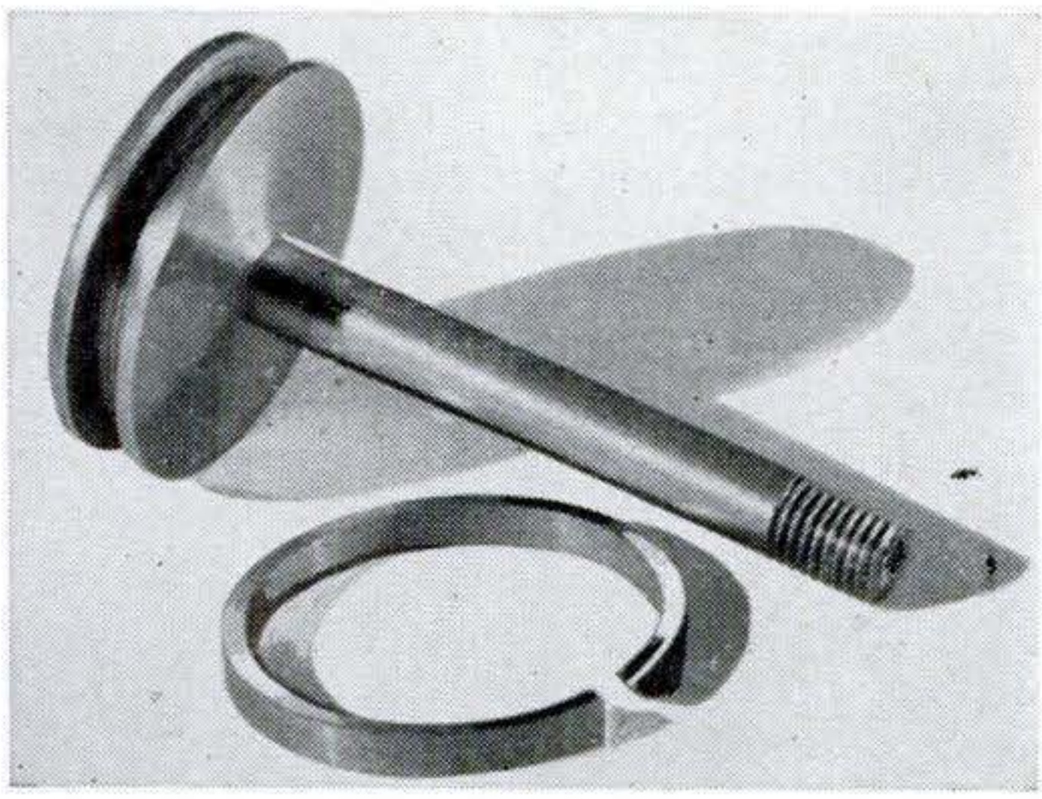
TO BE CONTINUED



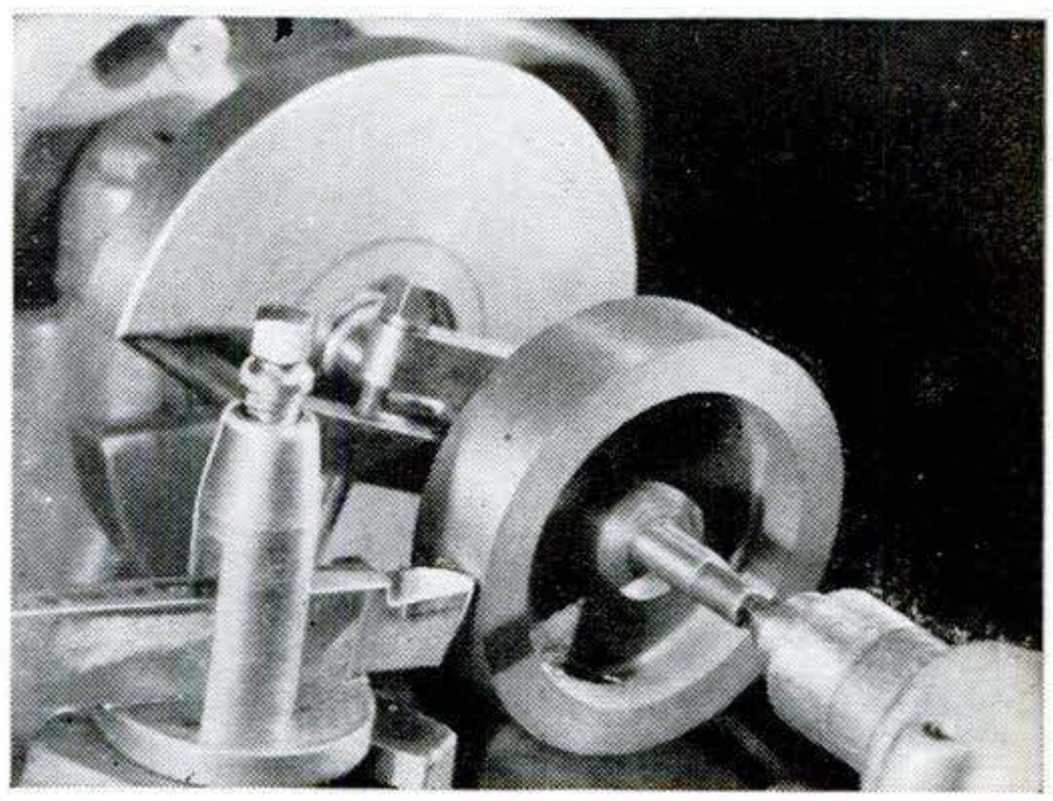
Shaping of the forked end is begun with a drilled hole and rough sawing, and the fork is brought to final dimensions by hand filing or milling.



Here the connecting rod is shown with its keeper, brasses, pin, and screws, together with the crosshead, which was described in Part I.

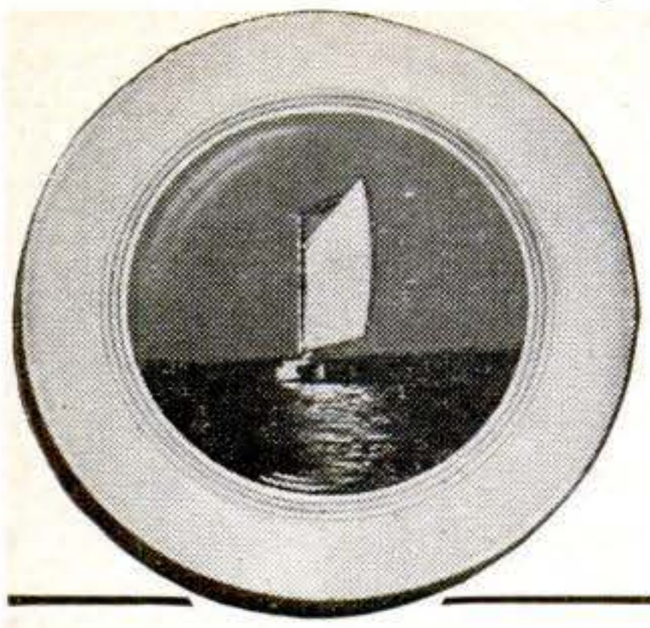


It will hardly pay to make your own piston ring, which is a standard size readily available. It is shown here with the completed piston and rod.



Rough-turned to size from a casting, drilled, and reamed, the flywheel is next mounted on a mandrel and its rim and hub are faced to run dead true.

Copyrighted material



Artistic photographic prints on plates decorate them interestingly for display on a wall. Still another use of the process (center) is on drinking glasses. At right, a photo turns a candy box into a jewel box.

Print Your Photos Anywhere

By Louis Hochman

WOULD you like to print your own favorite photographs on china, glass, plastic, and other surfaces? A prepared emulsion, easily applied to any surface, will permit you to add that personal photographic touch to dishes, glassware, costume jewelry, wooden and metal boxes, clothing accessories, and a score of other materials. Whereas previous methods yielded prints of poor tonal quality, this one produces results comparable to a well-exposed print on good enlarging paper.

The emulsion, originated by the Glenn L. Martin aircraft company for printing patterns on sheet metal, is available in small quantities for home use. Though glutinous as it is taken from the bottle, it is heated to a free-flowing liquid to be made ready for use. In that form it is sprayed or brushed on the object selected to take the print, converting it into a photographically sensitized surface. Then the print is made from the chosen negative by contact or projection and developed almost exactly as on paper.

That's all there is to it—hardly more trouble than conventional printing—and yet the possibilities remain virtually unlimited. Favorite negatives can be printed on book covers, beverage sets, dinner and decorative plates, scarves, pillowcases, stationery, furniture, luggage, jewelry cases, and candy boxes. Interesting textured results are possible with a variety of fabrics, metals, plastics, woods, leathers, and artist's boards. Smooth and closely woven materials naturally will take a better print than coarse or open surfaces, but the limitations are relatively few.

With a little extra imagination exercised in the choice of subject matter, picture stories can be told on the decorated surfaces. Highly acceptable personalized gifts can be contrived with miniature portraits of friends printed on cigarette cases, vanity sets, plastic or enameled brooches, unengraved signet rings, and the like. A baby, snapped at mealtime, could be reproduced on a set of feeding bottles. If you like the waggish or bizarre, a picture of yourself garbed as a beggar might adorn your wallet. Again, an animal, fish, or snake might decorate a decanter or beverage glasses.

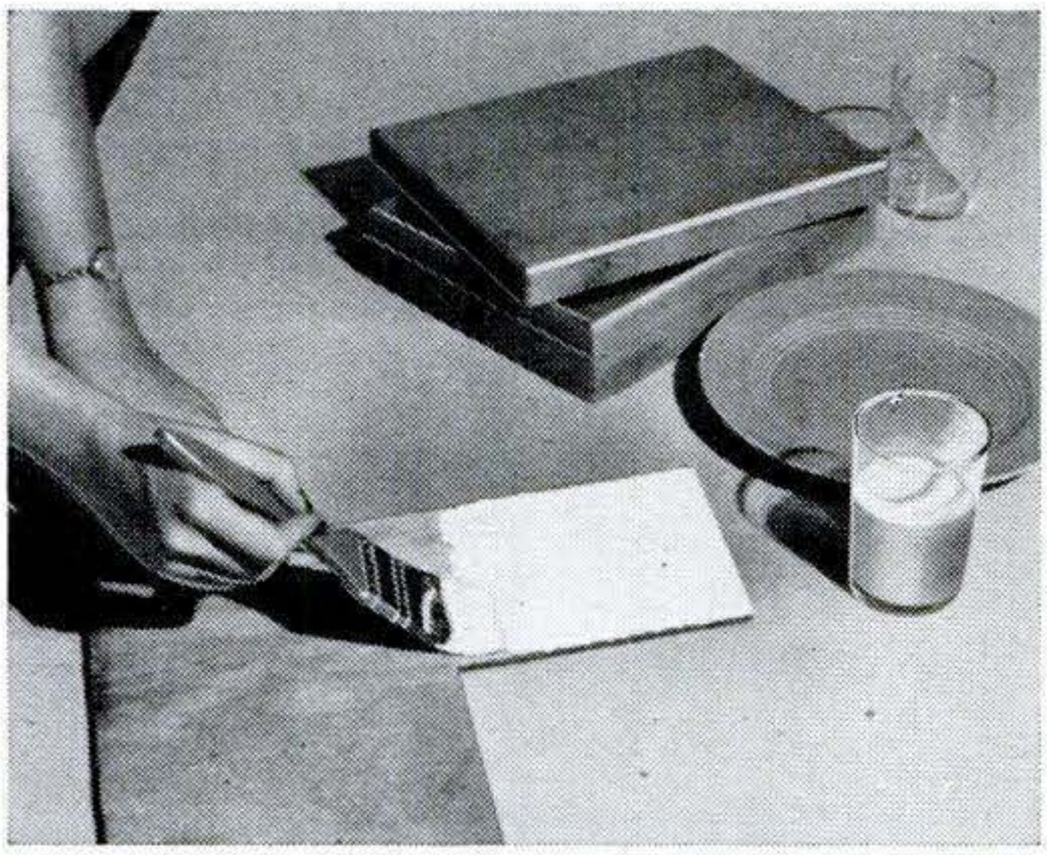
As a novelty, you can print the photograph directly on plywood and then jigsaw the outline and mount the piece on a stand for a desk ornament. The effect is similar to that of regulation photographs mounted on board and similarly jigsawed, the photographic quality is equally as good, and there is absolutely no possibility that the photo will become detached.

Equally effective are jigsaw puzzles made from your own negatives directly on the surface of the wood and protected with clear lacquer or varnish before the pieces are cut out. Puzzles thus made will stand years of use without peeling.

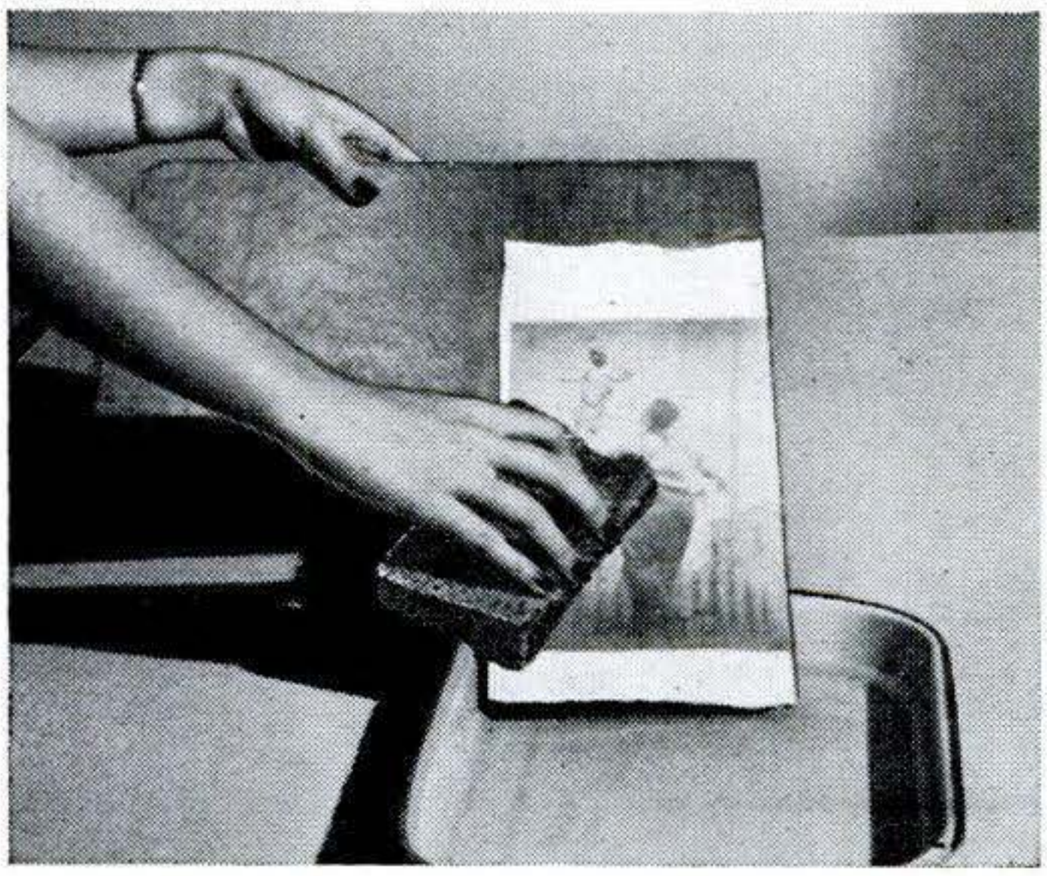
These are but a few suggestions to open up a wide new field for the amateur-photography enthusiast. With a little experience

Copyrighted material

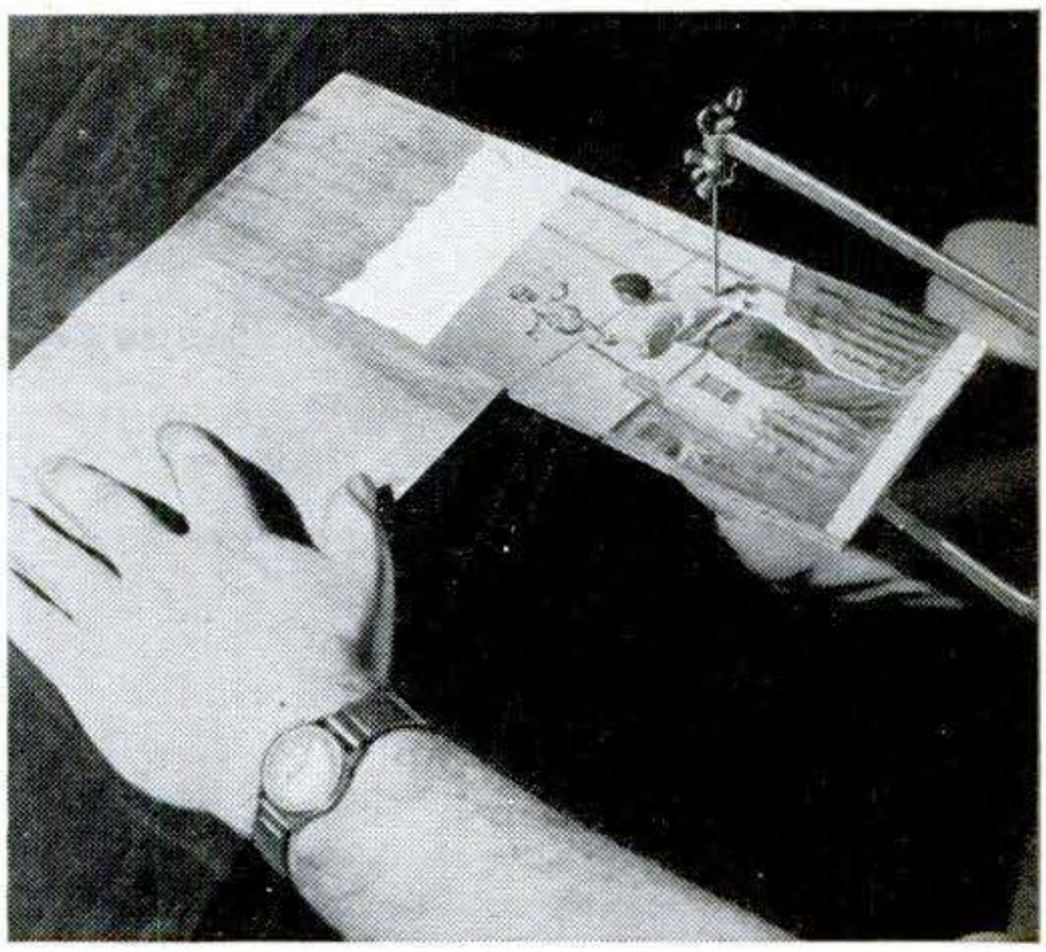
1 Heating reduces the gelatinous emulsion to a liquid for applying readily with either a brush or spray gun. All work is done under a safelight.



2 Plywood is sensitized with the substance in order to take the photographic print. White enamel as an undercoat keeps grain from showing.



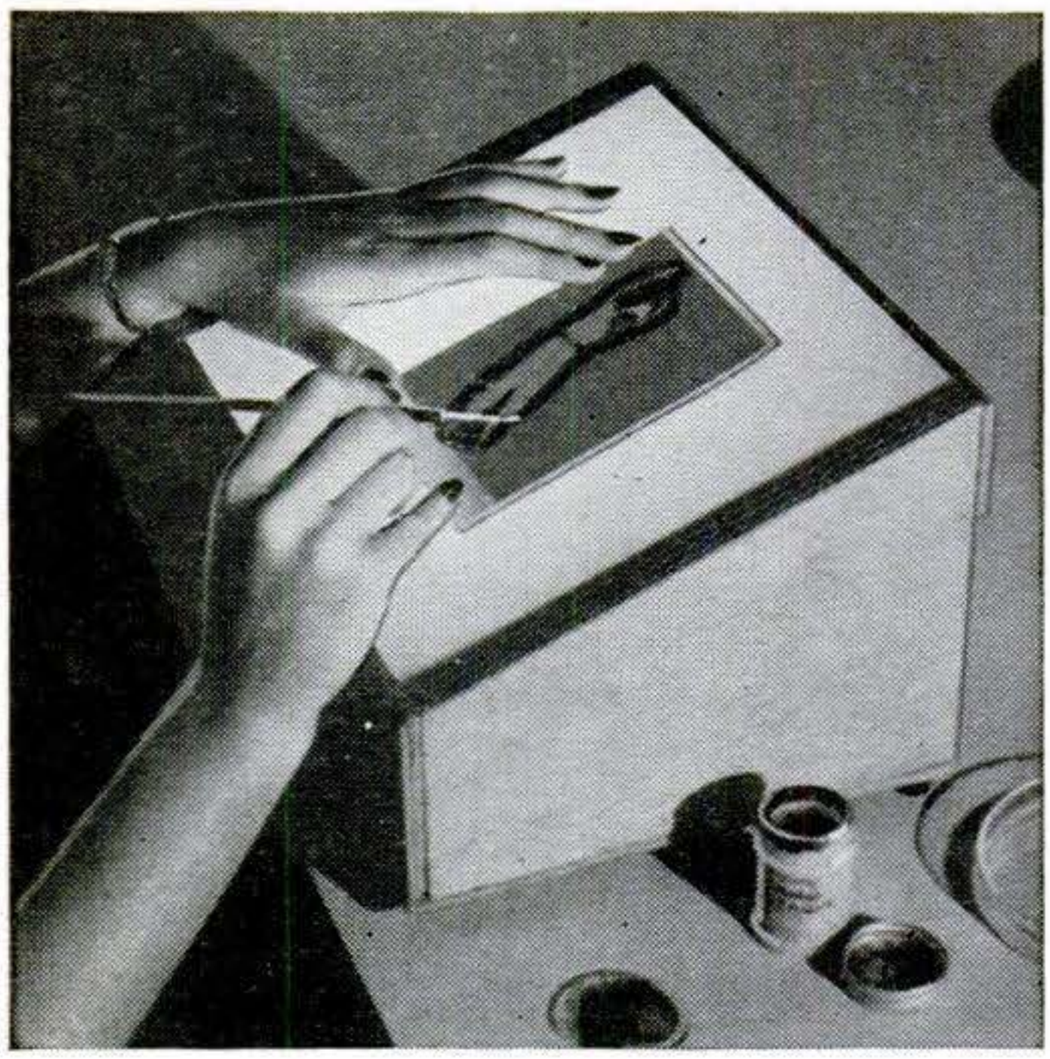
3 After exposure under the enlarger in the conventional manner, the print is processed by sponging with the developing solution and the ordinary baths and rinses that follow.



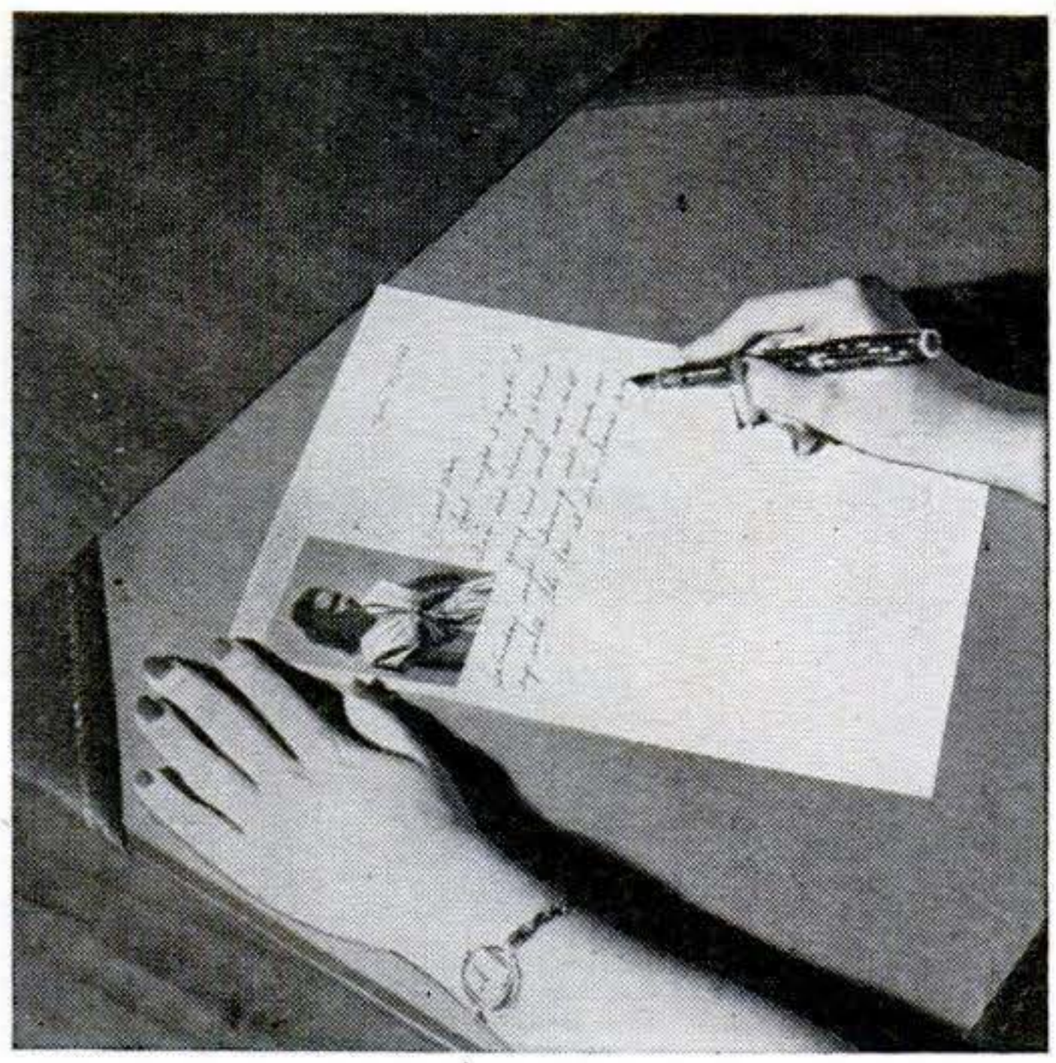
4 A photo novelty is created by sawing the figure outline. Prints are made similarly on an almost unlimited variety of materials.

5 Here is the completed job. The plywood photo mounted on a stand that supports it erect is suitable for desk display. Jigsaw puzzles can be made the same way from favorite negatives.

Copyrighted material



Negatives can be blocked out with negative opaque when only a portion is wanted for printing on the sensitized surface. That was the treatment given the cat print on the tumbler on page 194.



Highly personal writing paper is made by putting a portrait of the writer in the corner. Usually the developer, short stop, and hypo won't do any harm to material water alone will not damage.

and a fertile imagination, you will be able to discover many more exciting applications.

Absolute cleanliness should be the rule in using the emulsion, just as it is in other photographic development, and the substance should be handled, of course, only in a darkroom under a safelight. Melt it down in a beaker or tumbler set in a pan of water previously heated to about 115 deg. F. Take care to keep the temperature below 125 deg., for at that heat the emulsion fogs. When you become proficient, you may find it convenient to heat the substance over the fire in the top of a double boiler.

Arrange the object on a table covered with clean wrapping paper and place the surface to be coated level. Pour a little of the emulsion in the center and spread it quickly and evenly with a swab or soft-bristled brush. After the first coat has dried, apply a second in the same way. If preferred, the two coats can be sprayed on.

Thoroughly clean the surface to be coated and rinse with distilled water to remove all traces of foreign matter before attempting to apply the emulsion. Metals such as aluminum, brass, copper, and galvanized iron should be degreased and given a foundation coating of collodion. Plastic and glass surfaces should be washed with soap and water and rinsed in distilled water, and the emulsion used on them requires mixing with a minute quantity of a wetting agent.

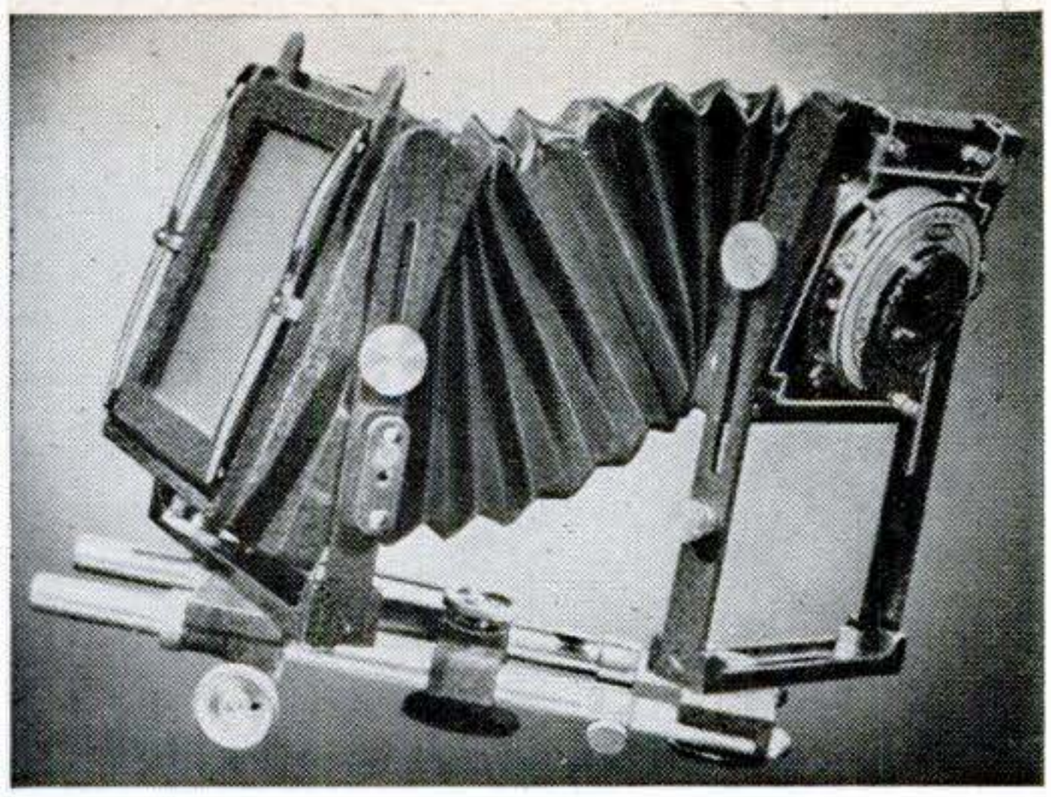
The emulsion is transparent after processing, and therefore it is important to know what effect you want before applying it. Patterns and grain textures in wood and other materials will show through the finished print, and the result may not always be desirable. To avoid this, the surface may first be given a coat of white enamel, or tinted prints can be obtained by using colored enamel for the undercoating. The prints have the qualities of transparencies on clear glass and should be viewed by transmitted light for best results.

Cloth should be stretched and tacked or held in an embroidery frame before receiving the emulsion. Masking-tape borders will help to localize the areas being sensitized and serve as guides during exposure.

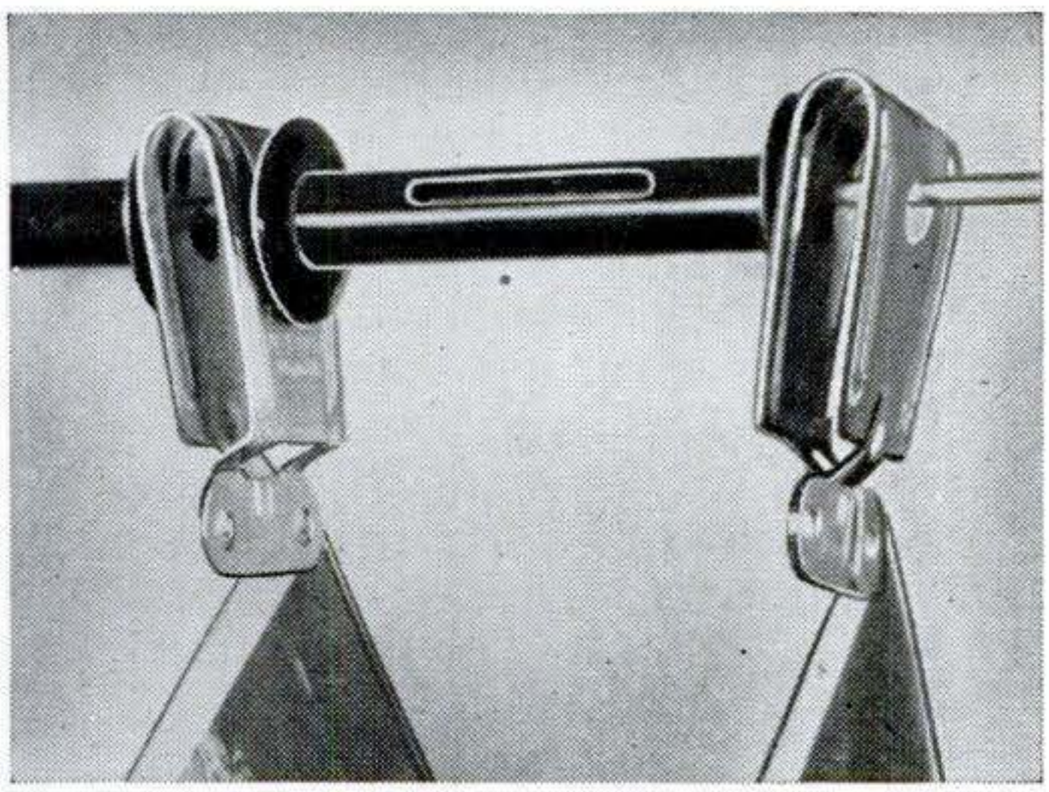
The exposure is made like that for other bromide emulsions. This coating, however, is almost twice as fast as, for instance, Defender Velour Black, and test strips should be made before attempting a final print. A good developer is D-72 used one-to-one. Follow with the usual short stop and hypo, and wash the print in running water for an hour before allowing it to dry.

Many of the commercial toners are effective for toning images on the emulsion to various colors, but it is a good idea to try a test strip in the toner first to check its reaction. Oil and water colors can also be used to give the print natural colors. Finally, the image should be protected with a coating of clear lacquer. END

Copyrighted material

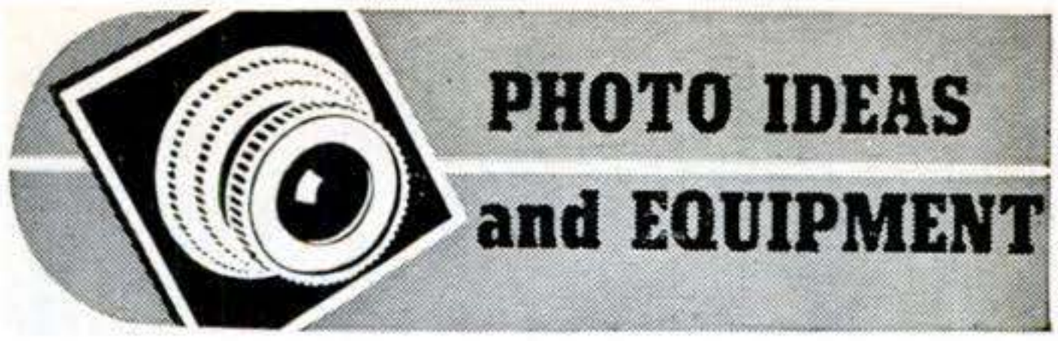


COMBINED PRESS-VIEW CAMERA. Fast-action adjustments on this universal 4″ by 5″ camera make it suitable for news photographers. Front and rear focusing, unusual flexibility of tilt and swings, a reversible bed, rotary back, and a 17″ bellows render it a view camera as well. Either film or plates may be used. It is made by the Brand Camera Co., of Los Angeles.

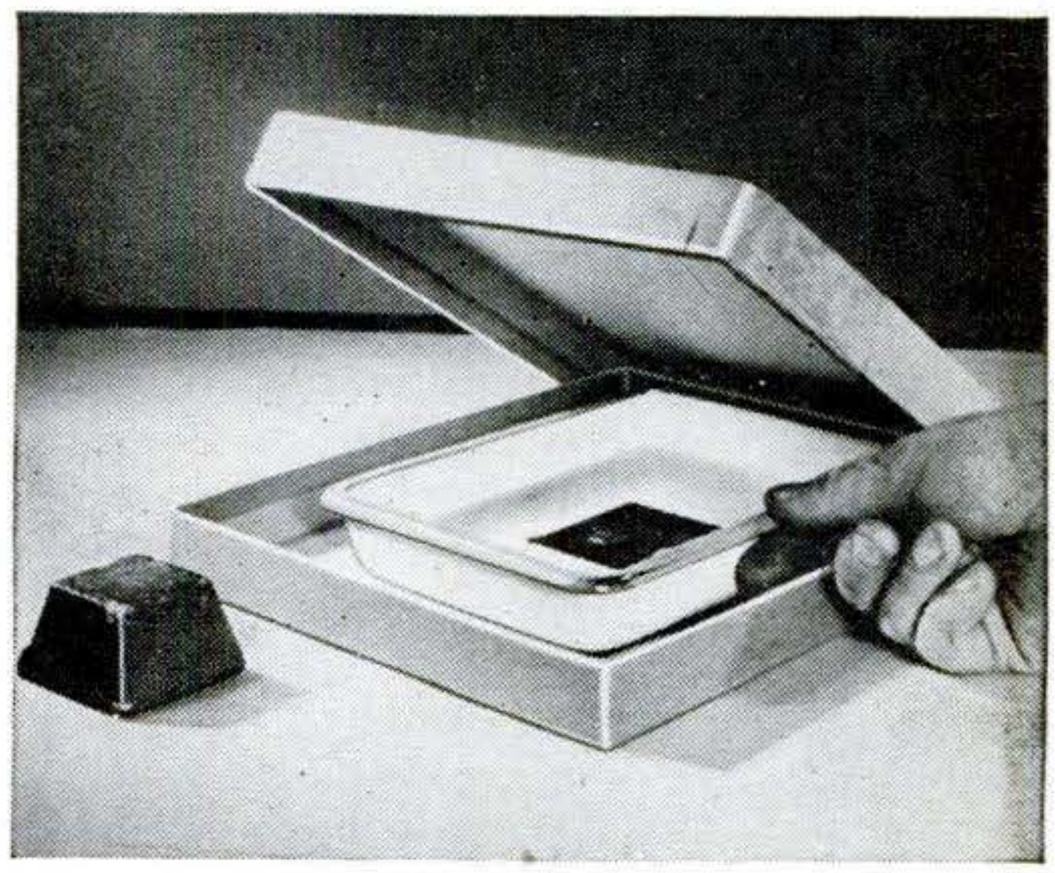


FILM SPACER. Spools strung out on a tight wire line prevent negatives from touching each other while drying. The spools are placed between clips as shown in the photo above.—TERRELL NICHOLS.

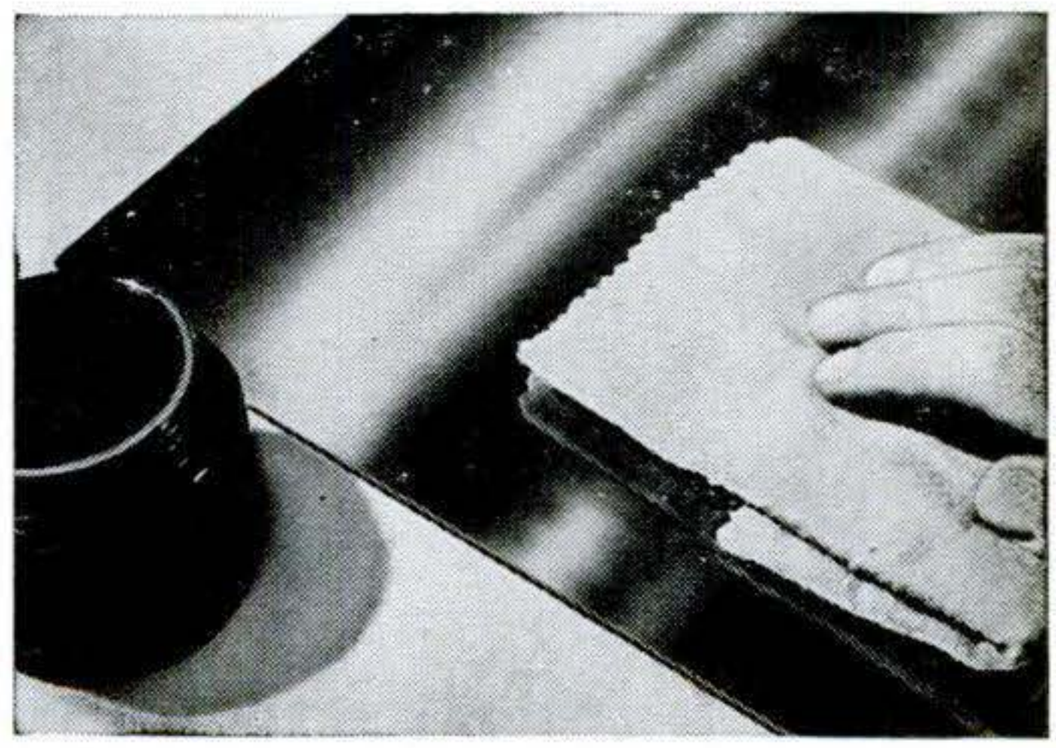
TELEPHOTO LENS. A new telephoto lens, the Magni-Far, is designed especially for Argus series C cameras, and utilizes the camera's built-in lens as part of the optical system. The Morton Company, of Minneapolis, intends to produce other range-extending lenses, each one for a specific camera. About $50.



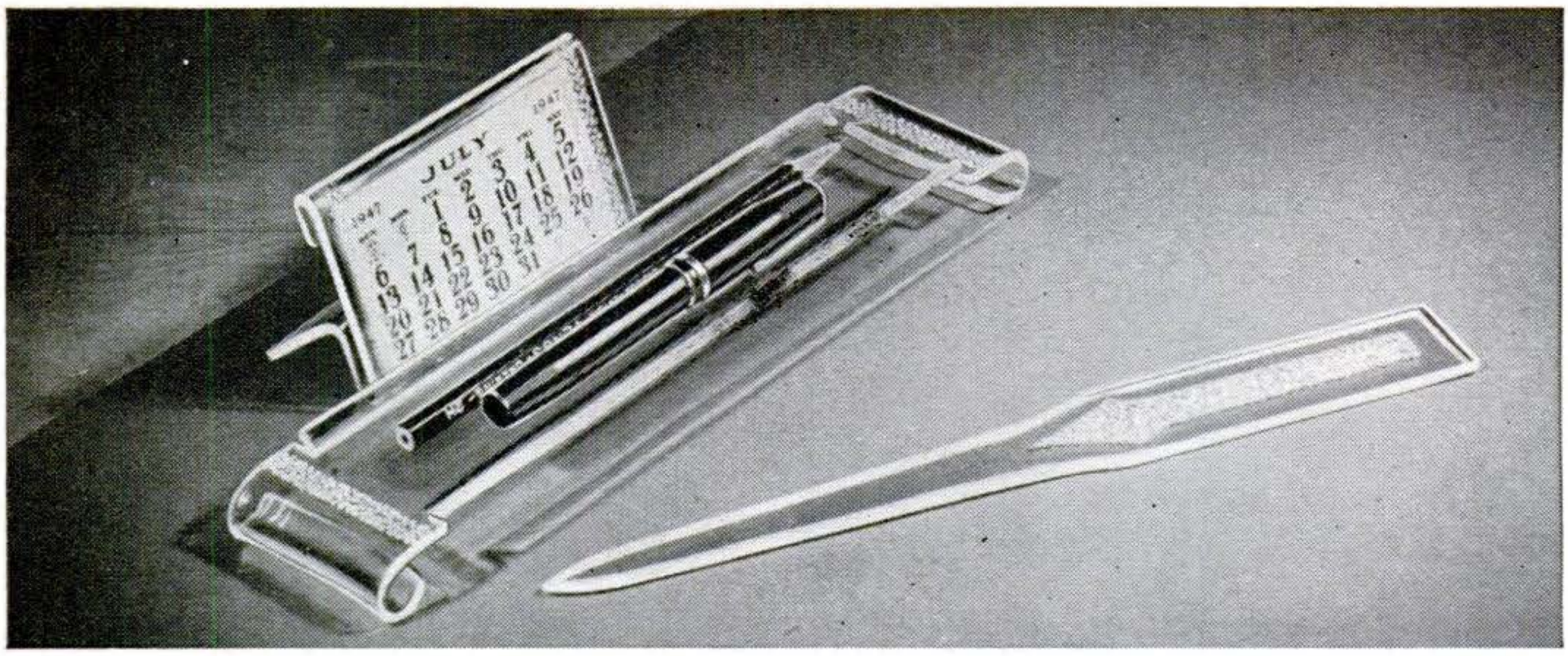
DEVELOPING IN THE LIGHT. You needn't rock a tray in the dark for 12 to 15 minutes during the first development of one or two color films or prints. After the film is immersed, place the tray inside a cardboard box with an overlapping, light-tight lid. The light can then be turned on while the tray is being rocked. It is necessary to turn off the light only when transferring the film or print to the short-stop bath.



POLISHING FERROTYPE TINS. Chemically treated cloths of the kind used for cleaning silverware are excellent for polishing ferrotype tins. Rubbing the cloth on a tin that has been moistened with a few drops of water quickly produces a clean, glossy surface to which your prints will not be able to stick.—WILL THOMAS.



Copyrighted material



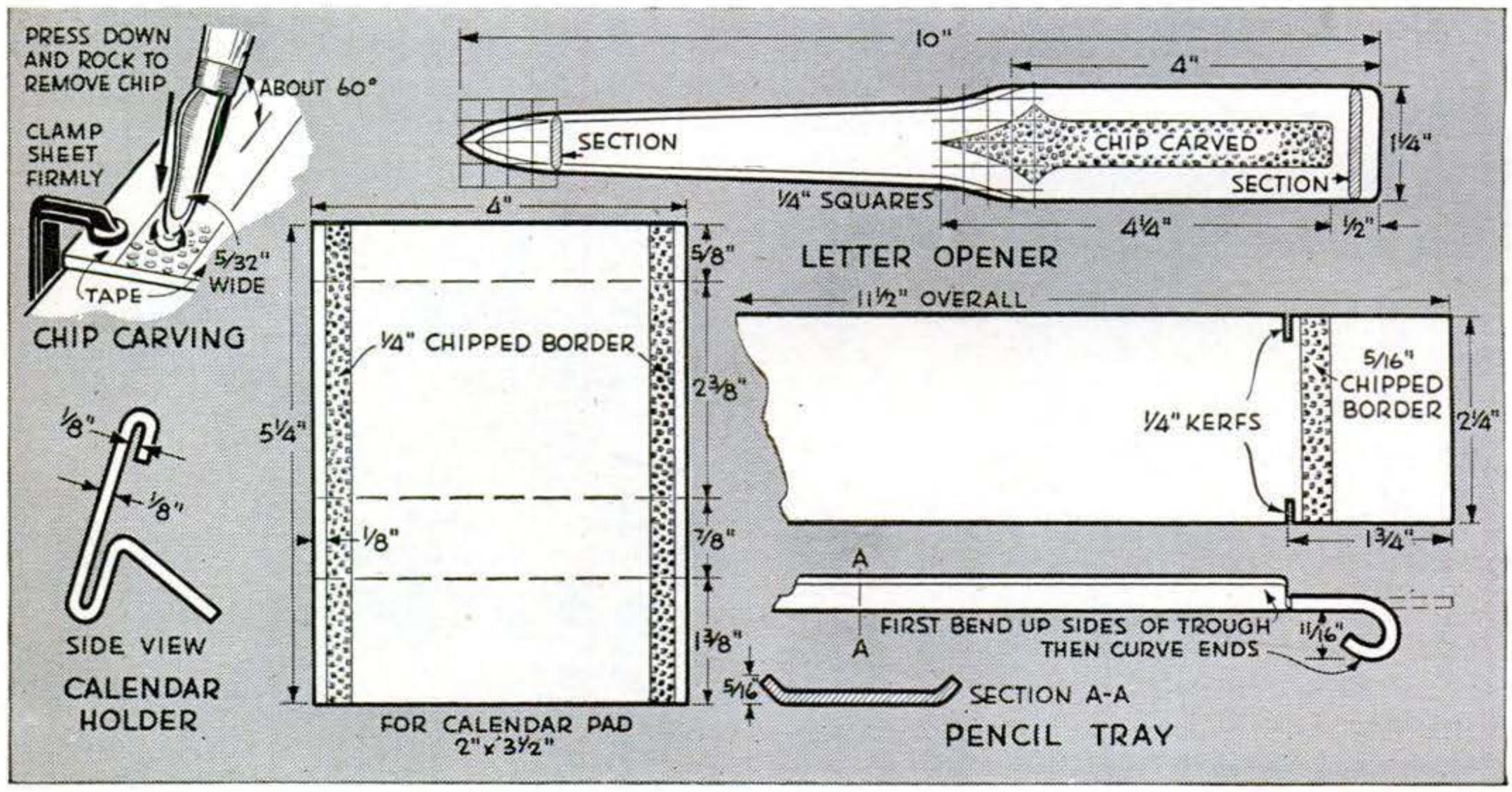
Chipping Gives Texture to Plastic

THIS clear-plastic desk set is decorated by a new technique that gives texture to ordinarily glass-smooth lucite and plexiglas. The calendar holder, pencil tray, and letter opener are sawed from ⅛″ stock and then chip-carved with a 5/32″ linoleum-block gouge. Outline the area to be chipped with a china-marking pencil and clamp the work. Gouge out a chip by pressing down firmly and twisting the gouge slightly until the chip is worked out. Practice on scrap first.

File and sand the edges of all pieces smooth after chip-carving has been completed. Bevel the letter-opener blade to sharpen both edges, but round the point a little to make it safe.

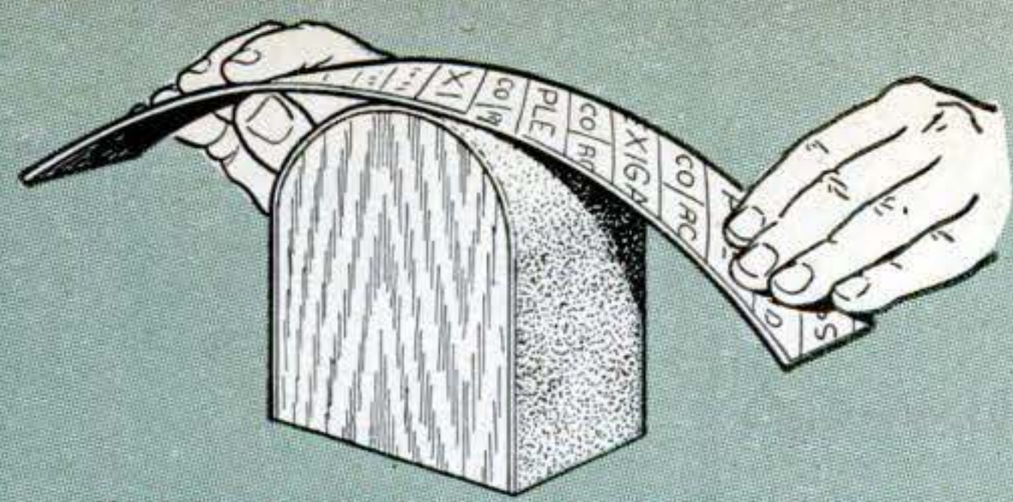
Heat the calendar-holder blank only where it is to be bent by shielding other areas with sheet metal and exposing it to a heat lamp 8″ away. Then bend with gloved hands over a ⅛″ thick wood guide rounded at top and bottom and wide enough to provide space for the calendar pad to slip in. Bend the stand end simultaneously over another strip.

The pencil tray is best formed upside down. Lay the plastic on a 2¼″ by 8″ wood strip with beveled edges, heat, and when soft roll the ends over dowels. Fast work is required. Reheat if the first attempts are not successful. Those who like color may dye the textured portions.—FRANK SHORE.

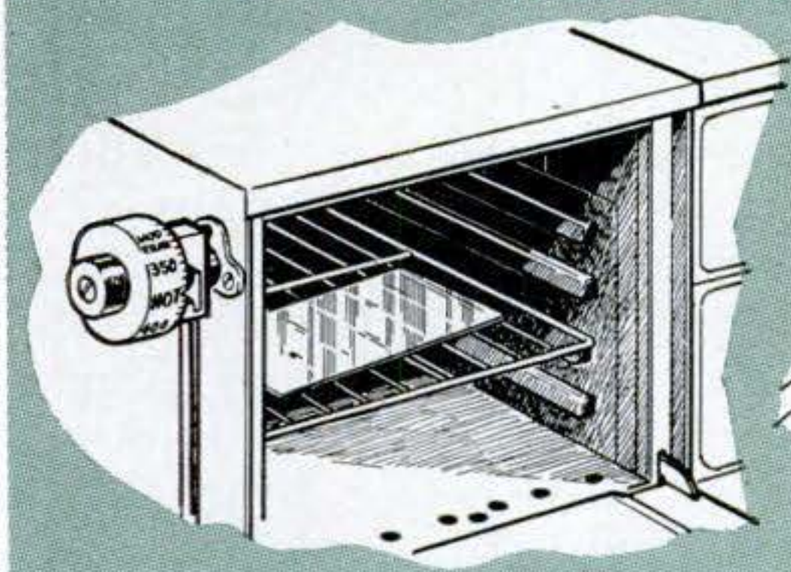


Copyrighted material

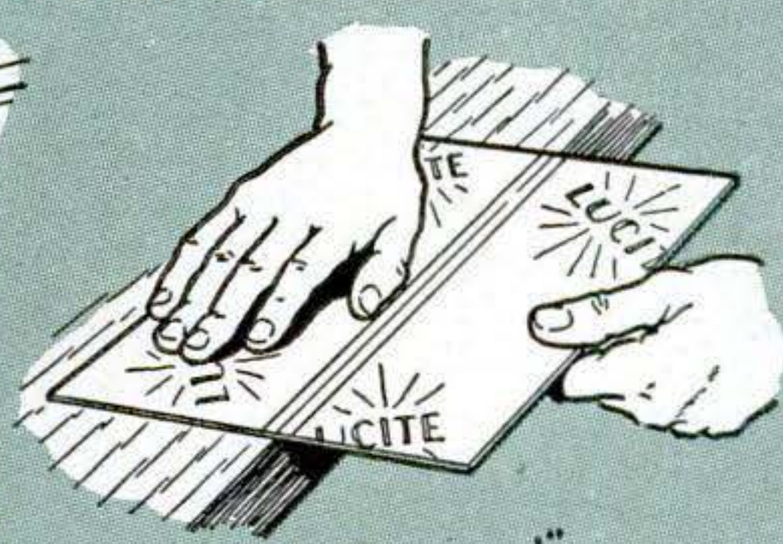
? WHAT'S WRONG



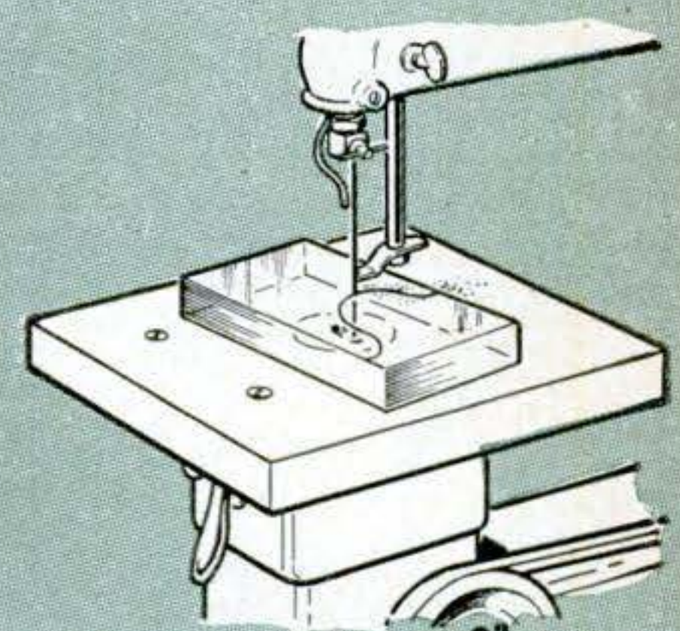
BENDING HEATED PLASTIC OVER A FORM



HEATING SHEET TO BE SHAPED



BREAKING 1/8" SHEET ON SCRIBED LINE



JIGSAWING CURVE IN 3/8" STOCK

CORRECT techniques for working clear acrylic plastics are part of the modern craftsman's lore. How many of these new skills have you made your own? Can you spot the errors in the operations shown above? There are two in Figs. 1, 2, and 4, but only one in Fig. 3.

ANSWERS

1. Masking paper must be removed before heating. If the hot sheet is to be hand held, gloves should be worn.

2. The oven regulator is set too high; excessive heat may blister the sheet (300 deg. F. is ample). The plastic should rest on smooth blocks, and not on the oven rack, from which the soft surface will take impressions.

3. Stock ⅛" thick should be sawed. Breaking along a scribed line is practicable only with thin sheet up to about .080" (1/12") thick.

4. Masking paper should be left on for sawing. Plastic ⅛" thick will "burn," or soften from the friction of cutting and solidify again behind the blade, if the latter is as fine as that shown. A coarse-toothed blade is needed.

CONCRETE PROPORTIONS [*HANDY MAN*]

Specifications for concrete mixtures always give the proportions by volume, such as 1:2:4, which means 1 part cement, 2 parts sand, and 4 parts pebbles or crushed stone. A sack of cement is equal to 1 cu. ft. If one sack of cement, 2 cu. ft. of sand, and 4 cu. ft. of gravel are used, a total of approximately 4.5 cu. ft. of concrete can be expected, not 7 cu. ft., since most of the sand and cement fills the voids between the larger particles. Waste and the size of the coarse aggregate cause some variation in the amount of finished concrete.

Following are proportions used for various concrete jobs:

1:1½:3 or 1:2:3—one-course roadways, walks, and floors; pavements; such watertight work as tanks, reservoirs, swimming pools, and cisterns; and such cast work as sewer pipe, drain tile, and fence posts.

1:2:4—general reinforced-concrete work, beams, columns, floors, and walls; work subjected to a moderate amount of water and dampness; bridges, engine foundations, and other work subjected to vibration; and silos, elevators, and coal bins.

1:2½:5—base courses for sidewalks, floors, and pavements; basement walls not required to be waterproof; foundations; mass dams; and retaining and wing walls of bridges and culverts.

1:3:6—mass construction, large footings, and large foundations.

POPULAR SCIENCE MONTHLY SHOP DATA

Copyrighted material

Dams Turn Water into Kilowatts

When you've figured out the power available and know where the water wheel is to go, it's time to start construction of the dam.

Part Three

By C. D. Bassett

CONCRETE, though desirable, isn't necessary for damming a small stream. Beavers have gotten by for years without it. Suitable materials can be found on almost any farm. Logs, roughhewn timber, rock, masonry, planking, gravel, sand, and clay are all useful. Choose the materials most readily available on your property, or the least expensive if you must obtain them elsewhere.

You will have determined, on the basis of the first two installments of this series, the height and width of the dam you will need to convert your stream to power. The summer months provide an ideal time for its construction, for then most brooks are at their lowest level and the water will not impede the progress of the work.

Four basic types of small dams are shown in the accompanying drawings. All are adaptable in general to the kind of materials likely to be on hand and also to the head of power desired.

There are two basic principles of design to bear in mind no matter which you build. First, a dam should be sealed both above and below its foundation to prevent the seepage of water through or under it. Seepage through a dam, if permitted, weakens the structure and will eventually break it; that under a dam will undermine its foundation. Then, too, some means must be provided to prevent undermining of the dam by the water that flows or spills over it.

In addition, you should check with your local authorities and possibly file plans for your dam with them. States have widely varying regulations, some extremely lenient and some fairly strict. In most, general supervision comes under the State board of health, but a visit to your local county offices will give you correct guidance.

Figure 1 illustrates the earth dam, which blends well with its surroundings and hence is particularly suited where landscaping or scenic qualities are to be considered. Sealing this type of dam is most important since seepage will literally carry it away if allowed to progress. The seal is put in first and the dam built around it. How far down it should go depends upon the kind of soil. A sand foundation, for instance, requires the seal to extend deeper than clay. If planking is used, it would be well to apply a protective coat such as tar or creosote.

A general pattern for depositing the earth fill is shown in the drawing, but it is not necessary to follow it unless different types of earth are available. Deposit the fill by layers, rolling and tamping each layer well. Then protect the waterside surface from erosion by covering it with a matting woven from brush. Plant turf on the top and downstream side to hold the earth.

Such a dam obviously cannot have water spilling over its crest since this action would wash it away. Two suggestions for handling the excess water are shown. The spillway must be of some material, such as masonry or planking, resistant to the erosion of rushing water, and the sides must protect the open ends of the earth dam from spillage water. An alternative method of handling runoff water is with drain tiles instead of a spillway. Some means must be provided for shutting them off. A simple cover on the upstream end would serve.

Figure 2 shows the framed dam, which likewise can be easily built, particularly on a farm where lumber in any form from logs to planks is abundantly available. Each frame consists of one joist on which the surface timber is laid and one or more struts. Once the height of the dam is determined, the size of individual frames will vary depending on the contour of the gulley, those frames located at the lowest part being the largest. The frames are spaced according to the support the surface timber needs, that is, the thinner the surfacing the more supports.

Lay the planking surface or roughhewn timber horizontally and edge to edge across the frames, and bolt or spike each in place.

Copyrighted material

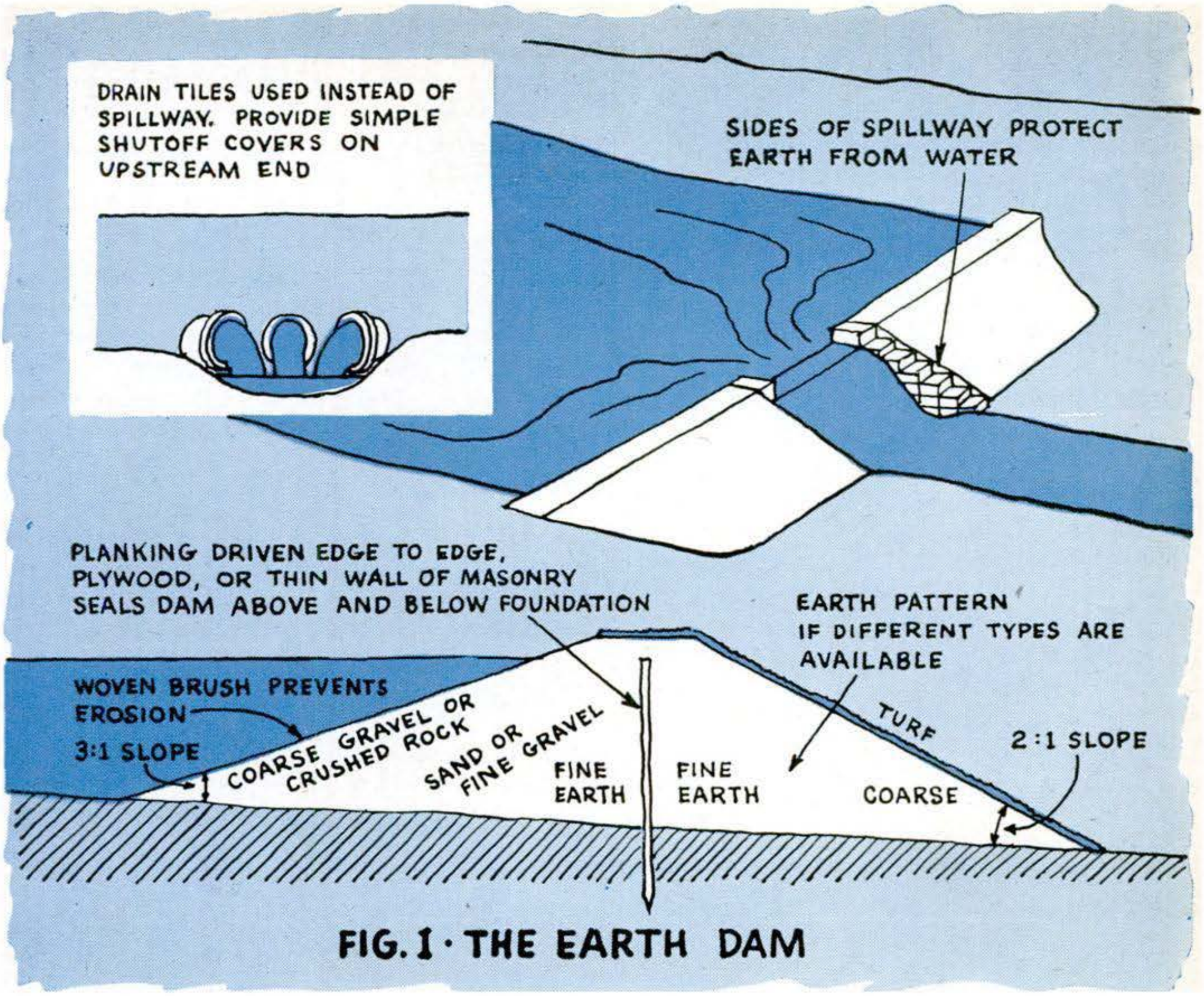


FIG. 1 · THE EARTH DAM

Calk the joints and apply a protective coating. Fill is put in behind the downstream side. Build the spillway entirely of planking or similar material.

The gravity dam, shown in Fig. 3, relies upon its weight for its stability. This dam would be most feasible where large rocks or field stones abound. Bricks, concrete or cinder blocks, and even chunks of broken concrete pavement are also excellent materials. The dam is strictly a masonry type, each block being laid with mortar.

Length is not a critical factor for any of these three dams, but it is important for the arch dam illustrated in Fig. 4. The placement of such a dam in a gulley is limited not only to the point of least width but also to the point where the banks are highest. Otherwise this dam would impound little water. It would seem unwise to build one to span more than a width of 10′. If the heavy timber is used only as a frame on which to spike or bolt a surface of planking, as shown in one of the drawings in Fig. 4, the number of timber arches will depend on the strength of the planking and also on the height of the dam.

Only earth foundations are considered in the drawings, but you may be fortunate enough to have a solid rock foundation on which to build. In that case a seal below the foundation will not be necessary, but some means must be provided to anchor the dam to the rock, such as with anchor bolts in the case of either the framed or gravity dam. Likewise the dam should be sealed at the rock foundation to prevent seepage under it.

In most instances it will be found best to restrict the width of the spillway for excess water to some part of the total length of the dam. This will always be necessary in the case of an earth dam to prevent washing. The spillage water may be allowed to pour over the entire length of framed, gravity, and arch dams, however, if the precautions shown in Fig. 5 are taken.

If the downstream side of the dam, or of the spillway, is a curved hard surface of masonry or timber approximating the natural curvature of the water flowing over, it will

Copyrighted material

guide the spillage water so it will be directed downstream without actually falling. Such a curved spillway surface is particularly satisfactory for an earth dam. Large rocks, bricks, or other hard objects placed on the downstream side of a spillway not having a curved surface will break the force of the free-falling water and prevent erosion.

The spillway in its simplest form takes the shape of a rectangular depression in the crest of the dam. It should usually be large enough to carry off sufficient excess water so that impounded waters will not top the dam at any season of the year. This, of course, is quite a problem, since accurate determination of spillway capacity requires a knowledge of the total area drained by the creek being dammed plus data on the amount of rainfall at all seasons.

However, most of us will know whether or not the creek we are damming stays within its banks during the year. If it does, then a safe rule to apply would be to make the area of the spillway equal to the cross-section area of the creek at the dam when it is brimful or just ready to flood. The formula is illustrated in Fig. 6.

If the stream does flood, then either construct a dam that in an emergency can allow water to top its full length or build some sort of floodgate into the dam so it can be opened when necessary. One form such a floodgate could take is a group of drain tiles through the dam, as shown in Fig. 1.

The height of the dam you build will be determined by the area of the land to be covered by the impounded water. In general, the higher the dam, the greater the area covered by water above it.

All vegetation, brush, floatage, and the like in the area to be flooded and for about 15′ around it should be burned out or otherwise cleared before the dam is built. This keeps down the breeding of mosquitoes and helps retard pollution. It is required in the regulations of some States and is a wise precaution even when not covered by law. In addition, all trees in the area to be flooded should be cut reasonably close to the ground. TO BE CONTINUED

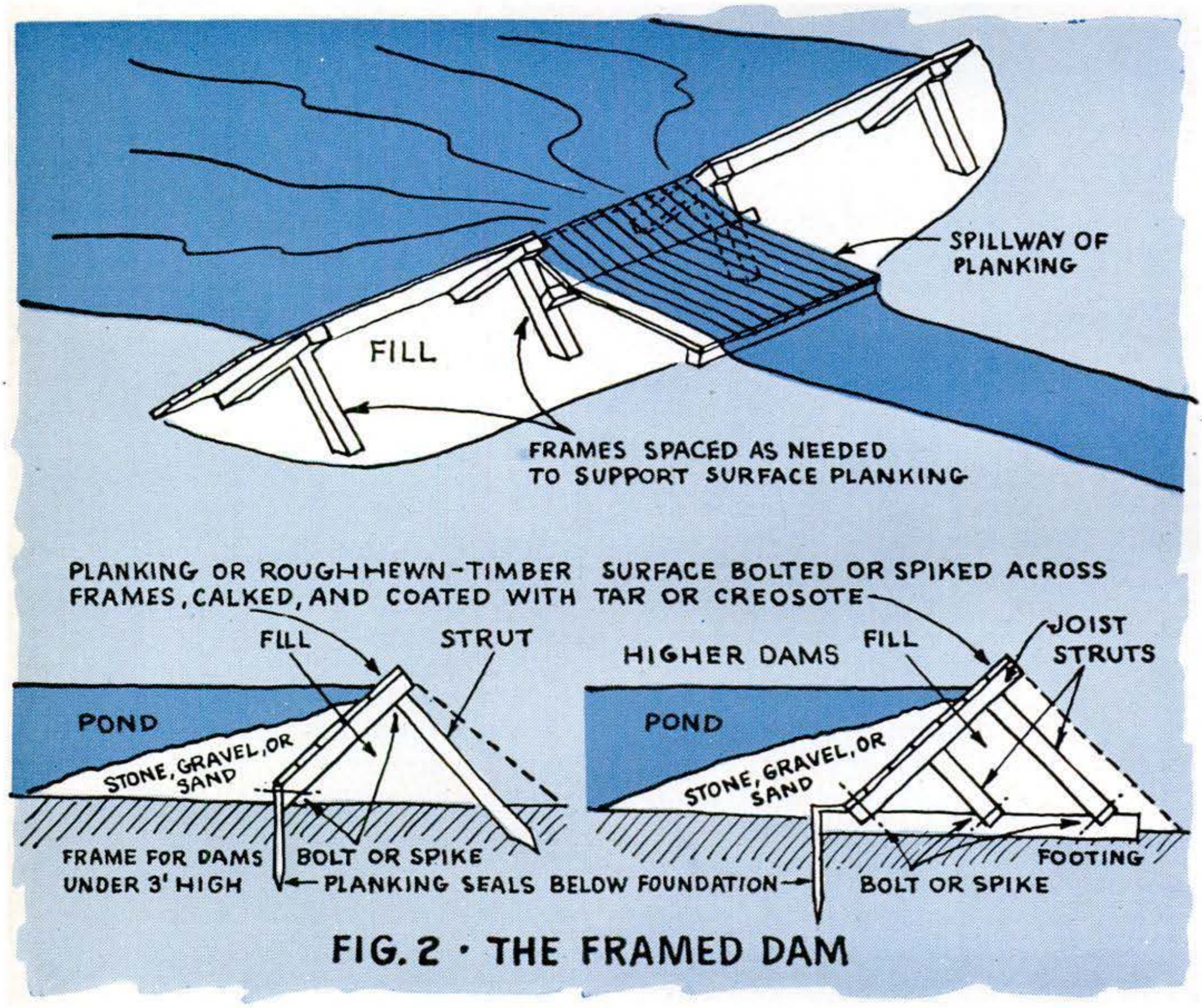


FIG. 2 · THE FRAMED DAM

Copyrighted material

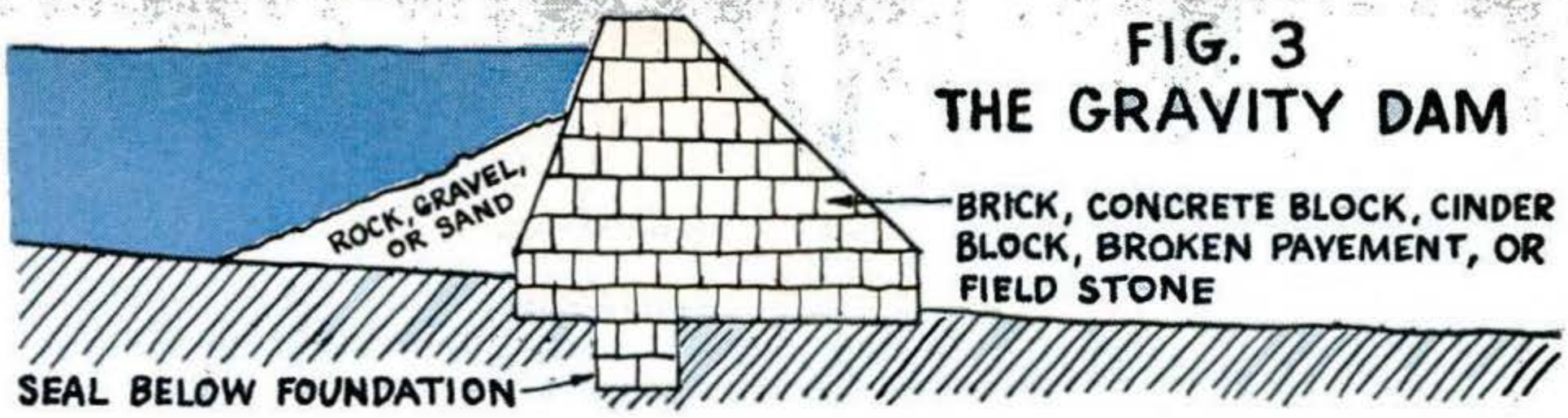


FIG. 3
THE GRAVITY DAM

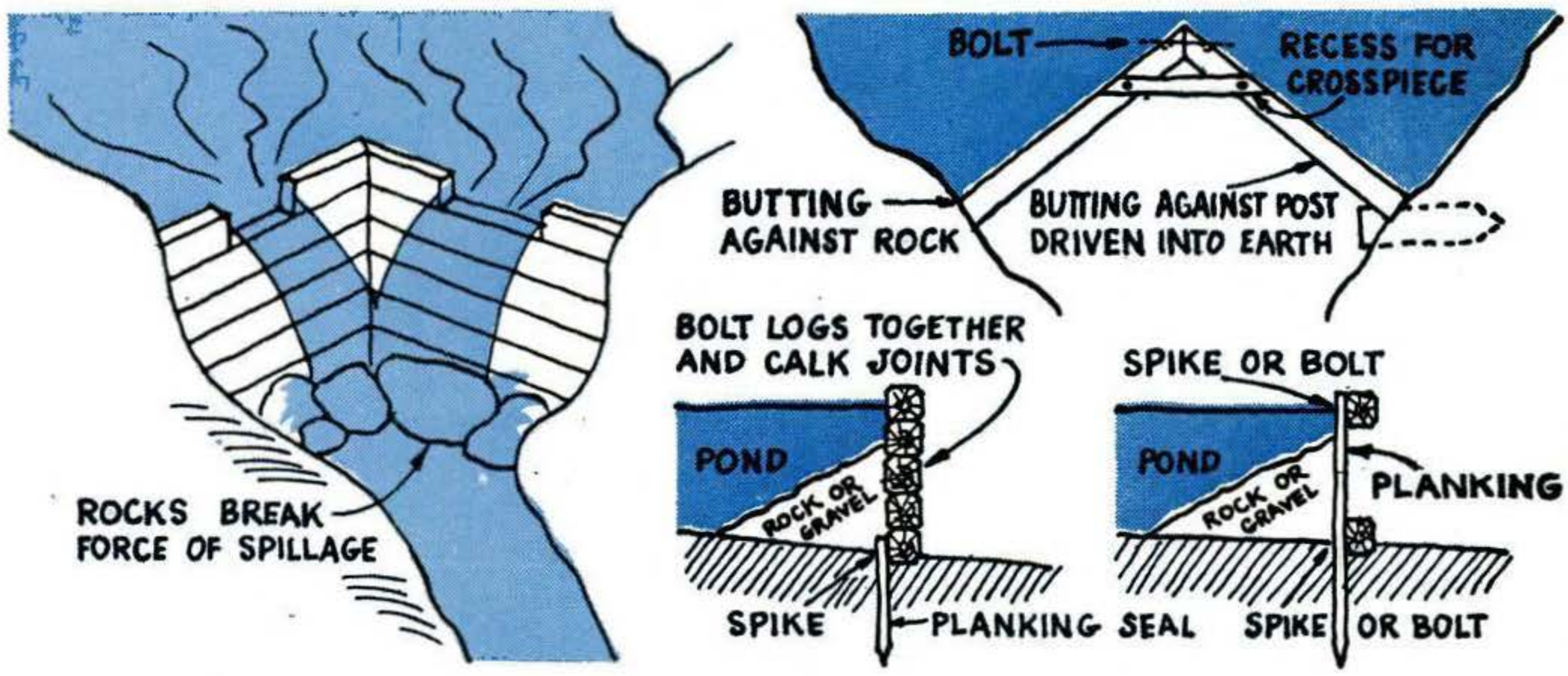
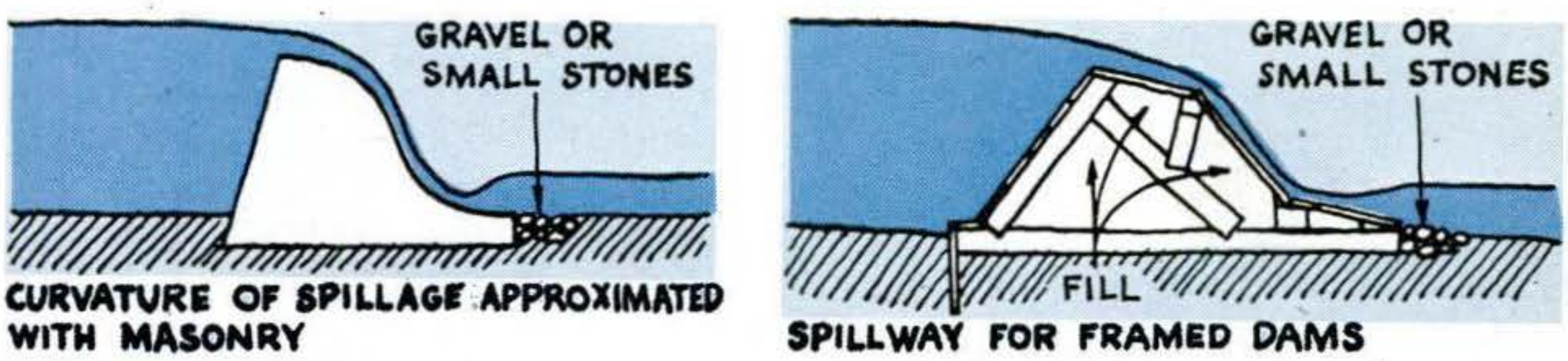


FIG. 4 · THE ARCH DAM



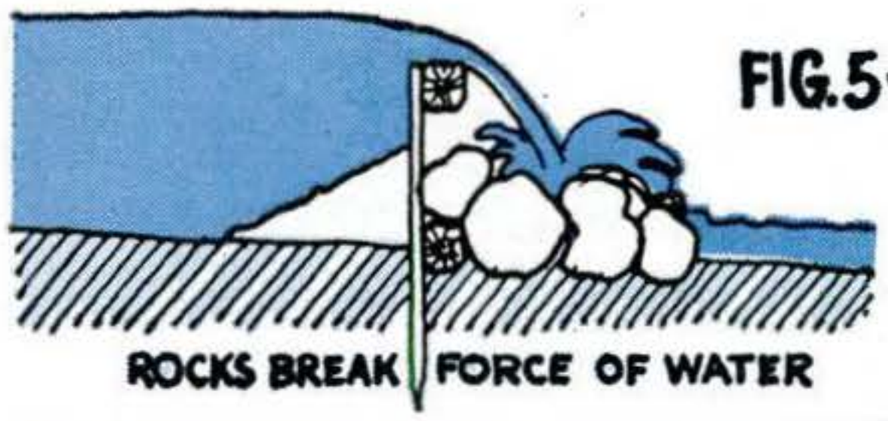


FIG. 5 · METHODS OF PREVENTING SPILLAGE WATER FROM UNDERMINING DAM

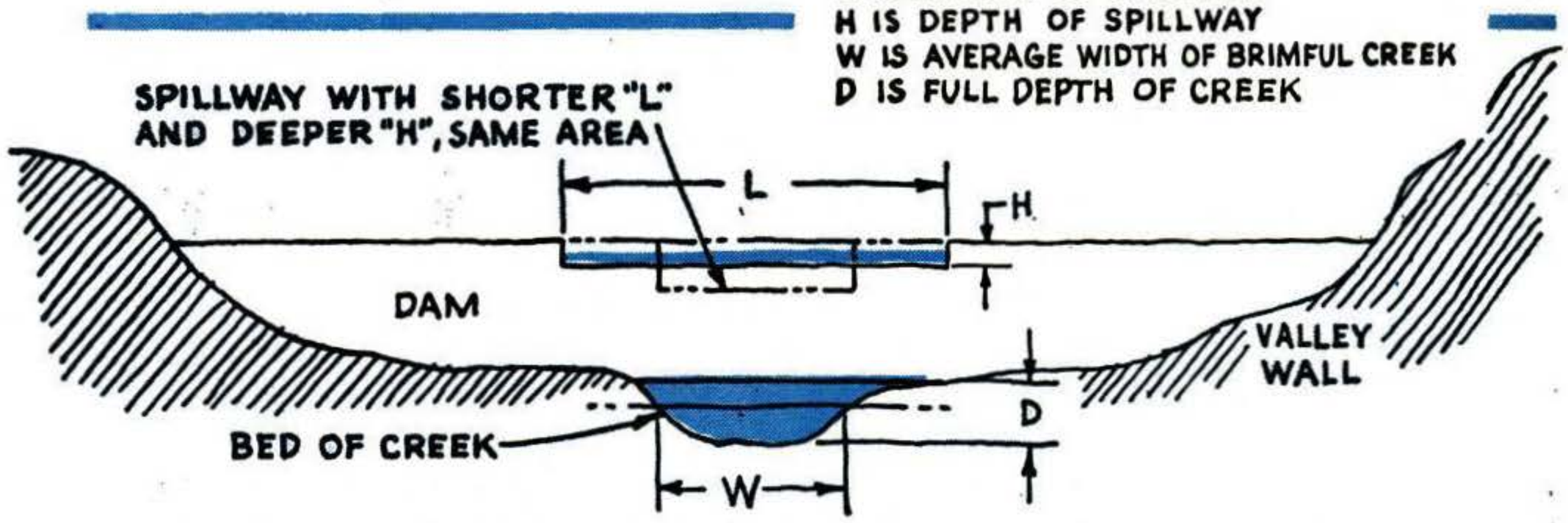


FIG. 6 · DETERMINING THE SIZE OF SPILLWAY

Copyrighted material

More Power to You

Here are three designs for D.C. power supplies that will furnish rectified voltages for receivers, transmitters, test equipment, and other uses.

SMALL power supplies capable of furnishing filtered and reasonably pure direct current always have a place on the experimenter's workbench. For some equipment, of course, power packs must be designed to give specific currents and voltages, but for the majority of applications one or more of the three units described here can be used. They will conserve battery life in portable apparatus, balance a Wheatstone bridge, extend the range of an ohmmeter, or provide bias or power voltage for experimental amplifiers, receivers, and transmitters.

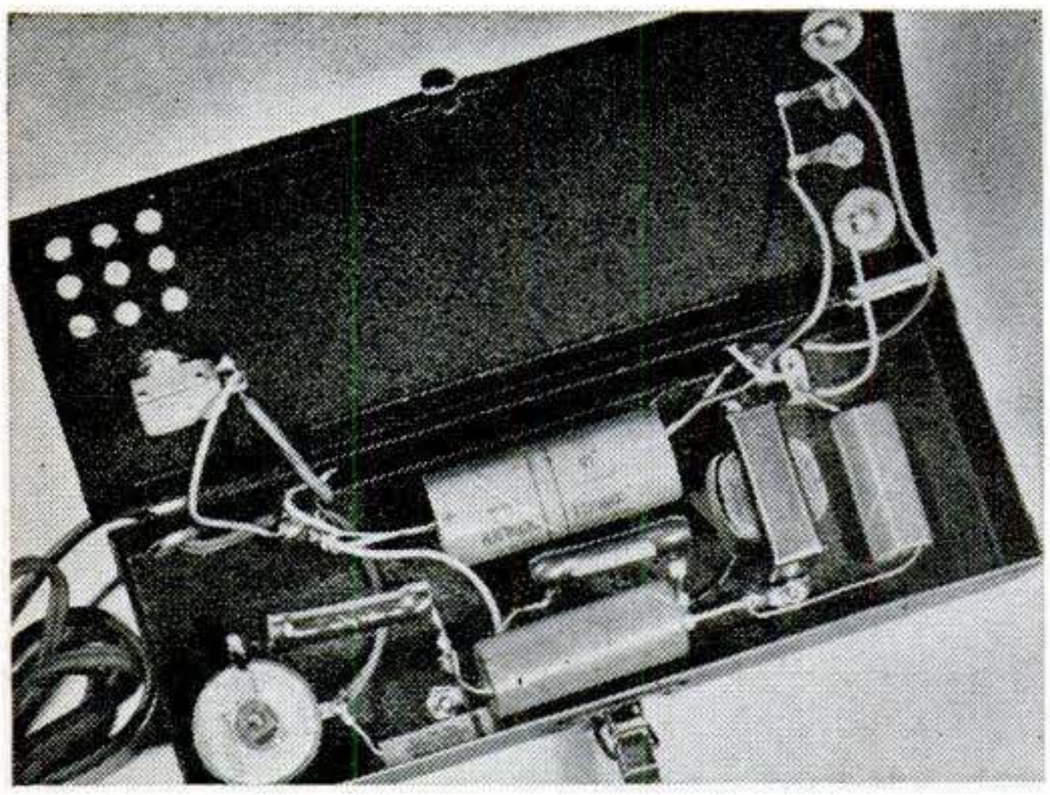
Dry-disk rectifiers, recently made available to experimenters, replace rectifier tubes in many circuits. The selenium disks require only two soldered connections. They have no filaments and therefore require no separate filament supply. Because of their rugged metallic construction they are also able to withstand a lot of knocks. Two of the three circuits given below employ these new rectifiers; all three are made of easily obtainable and standard parts.

Selenium rectifiers are color-coded to indicate polarity. The positive side, indicated by a red dot or some similar marking, is equivalent to the cathode of a rectifier tube; the negative side, marked with black, functions as the plate. The position of the red dot in relation to the other circuit elements is shown in the diagrams.

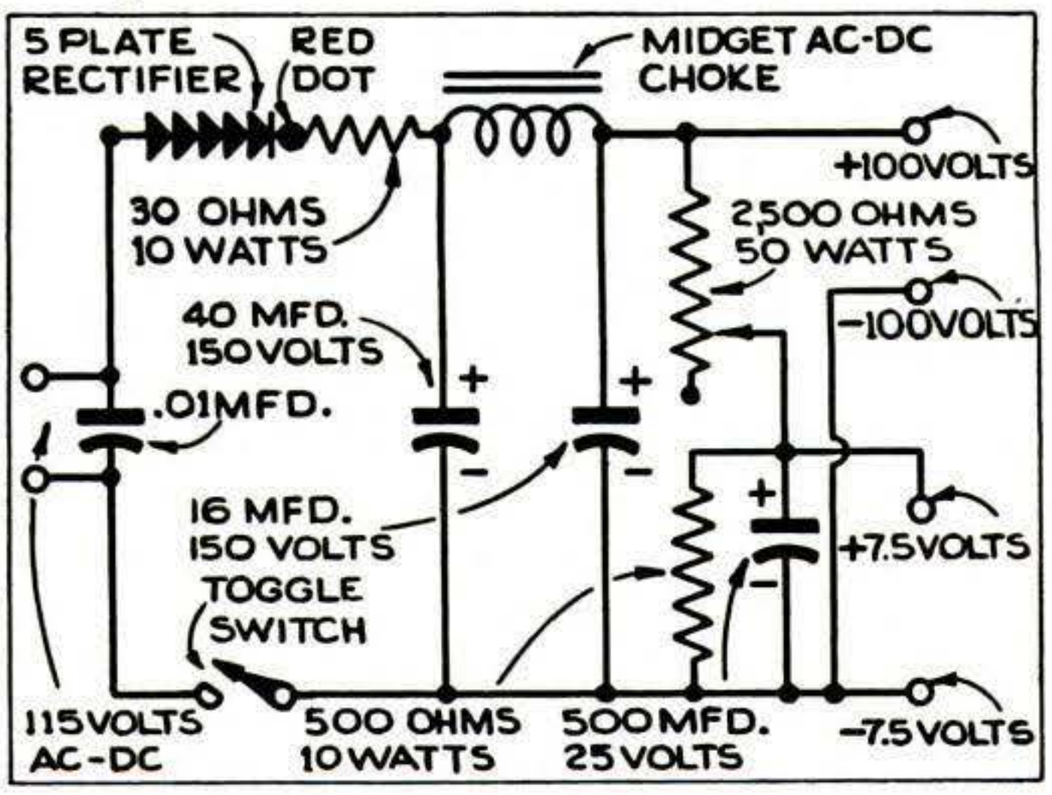
Battery Eliminator

The dry-disk battery eliminator shown on these two pages was built by Frank Tobin as a companion piece for his three-tube superheterodyne receiver (PSM, April '47). It is shaped to fit the battery compartment of his and other radios and can be used with practically any receiver that requires approximately 90 and 7.5 volts of B and A supply respectively.

In order to use the eliminator with the three-tube receiver, it is necessary to connect the tubes in series so that the current drain will not exceed 50 ma. Many battery tubes have their filaments arranged so that they may be connected either in series or in parallel. As originally built, the set placed all the tubes in parallel to operate on a 1.5-volt battery. The diagram on the facing page shows the changes that must be made if the set is to run on the higher filament voltage. Simply putting the tubes in series without modifying the associated circuit shown by the blue lines would also have the effect of raising the A.V.C. voltage to 7.5 volts—equal to the sum of the tube voltages. In



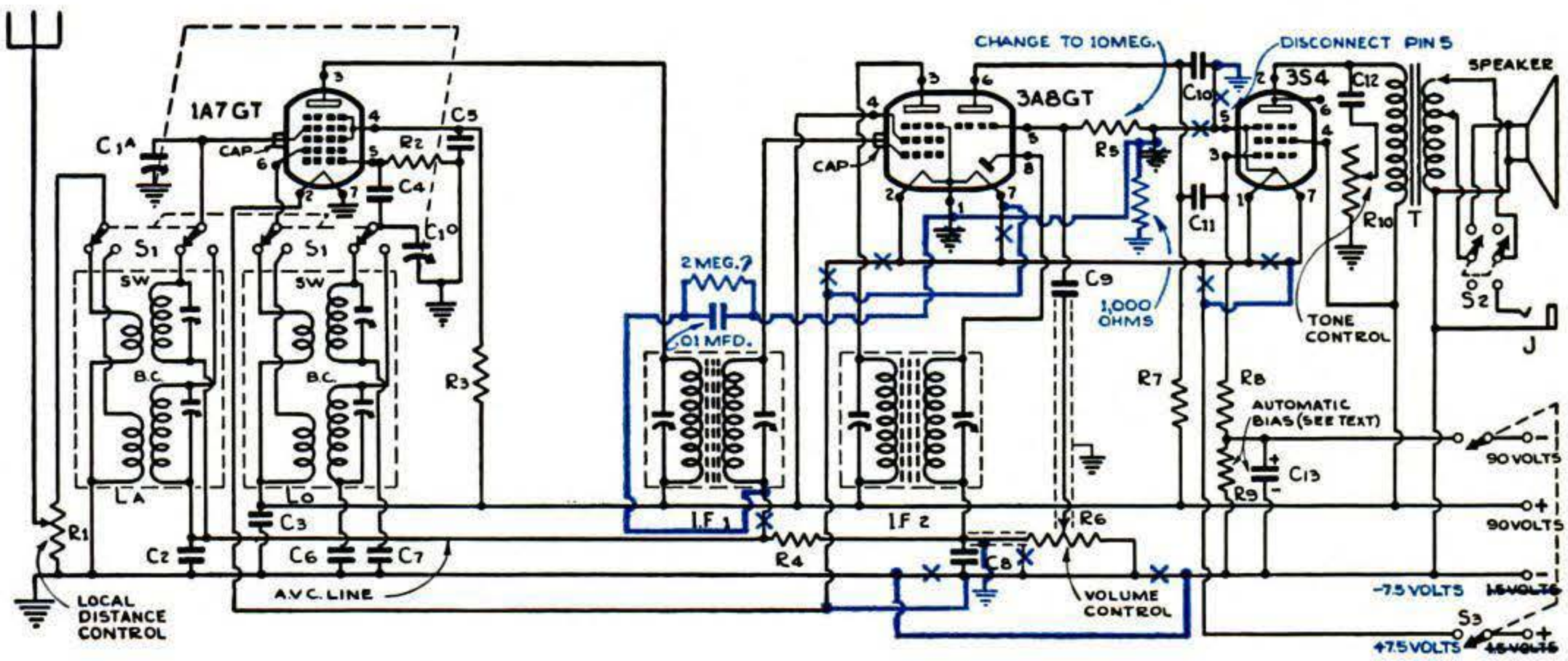
An oblong metal tool box that will fit readily into the battery compartment of most receivers is both the chassis and cabinet of this power supply.



The parts used in this simple rectifier unit may be purchased for a couple of dollars. They will save many times their cost in battery replacements.

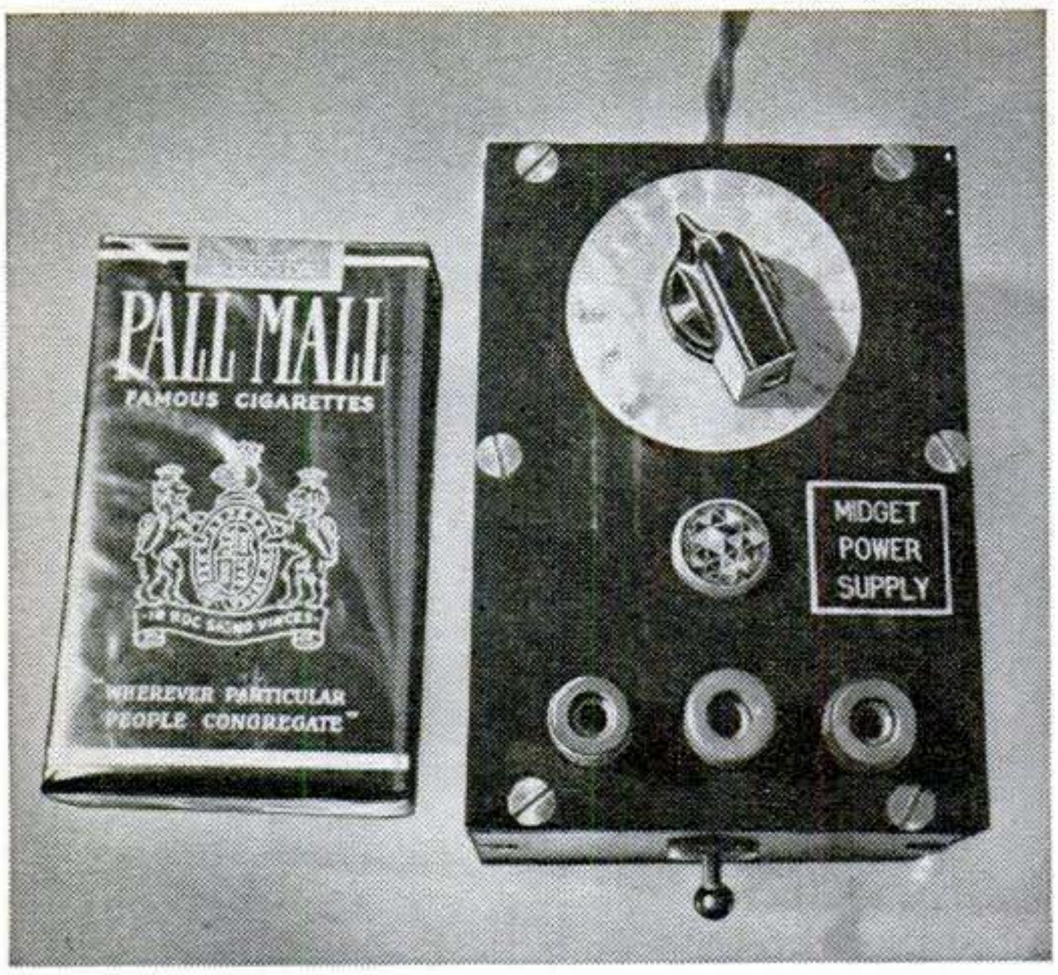
Copyrighted material

When used with the rectifier, the superhet circuit must be altered as shown by the modified diagram, below.

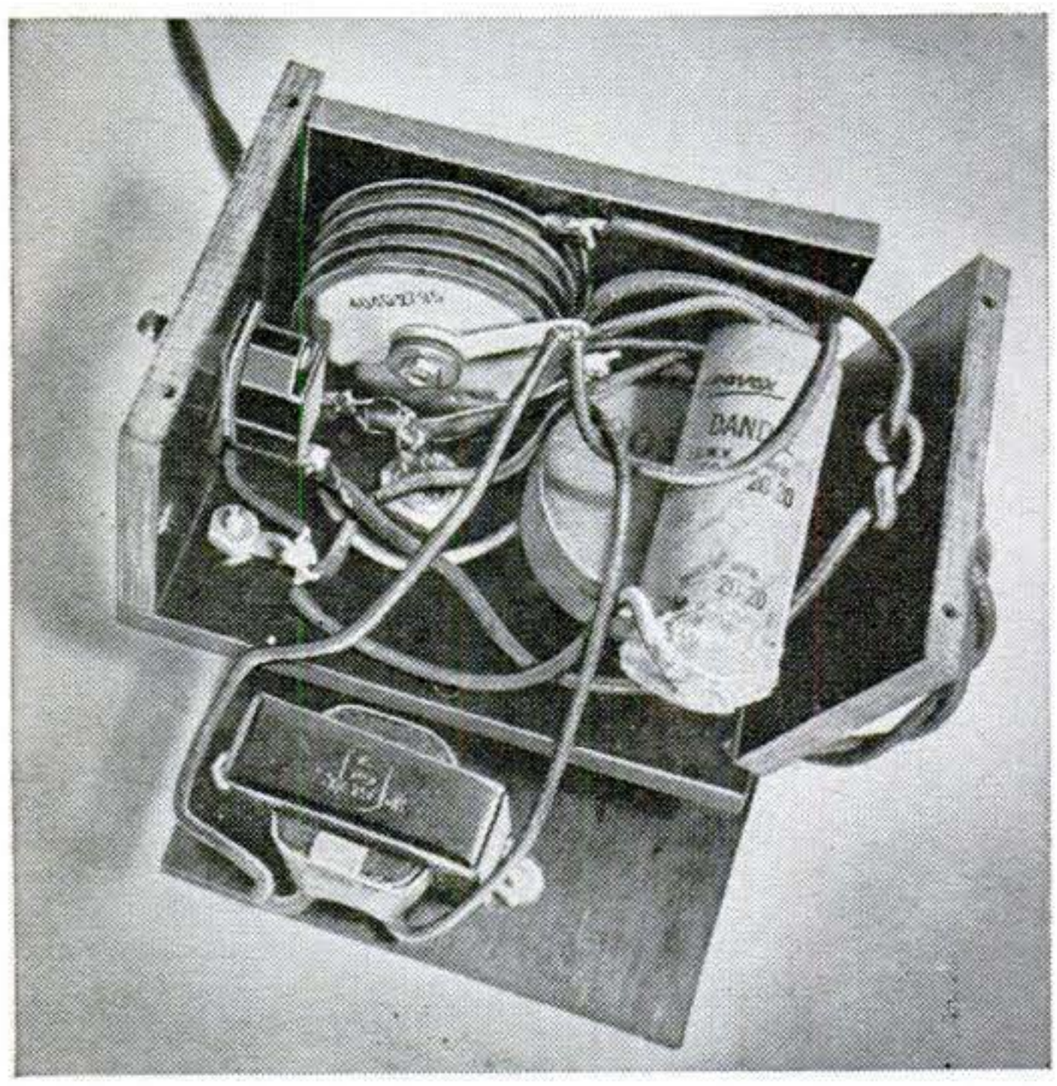


New connections in the filament circuit are indicated by added blue lines; remove leads marked with an X.

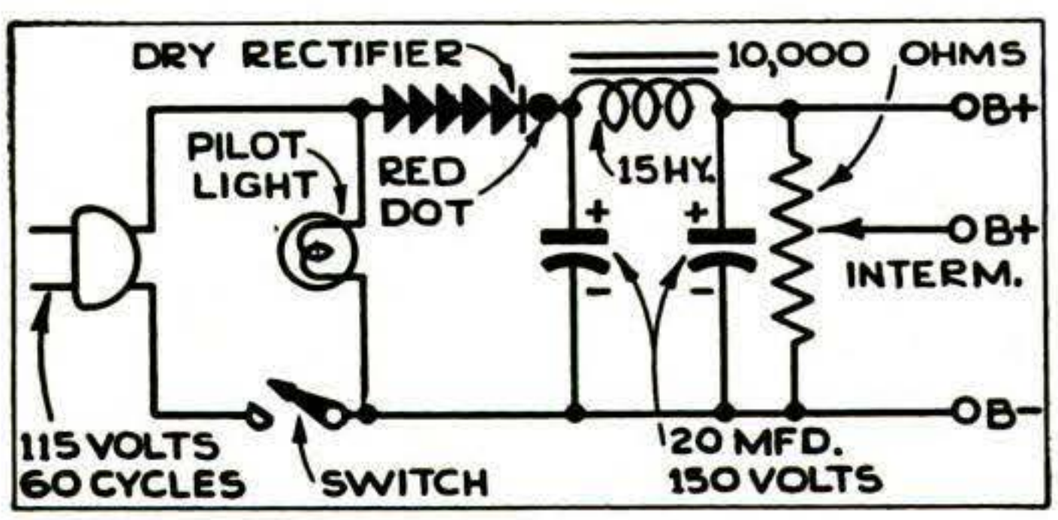
Copyrighted material



A small bakelite box houses the midget rectifier. The voltage control, pilot light, and output jacks are conveniently placed on top of the cabinet.



Position of the parts is not critical but it is desirable to allow as much space and ventilation as possible around the dry-disk rectifier stack.



Output of this power supply is variable from 70 to 140 volts. If the ripple is objectionable, increase the size of the first condenser to 40 mfd.

other words, the set would have to receive a signal of 7.5 volts before it could operate. Since received signals are generally on the order of microvolts, it is evident that no sound will reach the loudspeaker unless these other changes are made. The alterations in the circuit, indicated by the blue lines in the diagram, should not take more than half an hour to accomplish.

Because a considerable amount of heat is dissipated through the 2,500-ohm dropping resistor, a unit with a rated value of 50 watts was selected. The high wattage gives a safe margin against overheating, but a 25-watt resistor of equal ohmage may be substituted provided that it is used outside the cabinet and is otherwise well ventilated. The variable tap on this resistor allows for accurate adjustment of the A voltage.

A small metal tool box is used as both chassis and cabinet of the battery eliminator. The metal box also serves as a shield around the rectifier, cutting down the induced hum. Holes are drilled in the cover just above the dry-disk rectifier to provide the necessary ventilation. The wire-wound resistor is placed outside the box.

Midget Power Pack

In the operation of battery radios, the major item of cost is the B battery. Regardless of filament requirements, therefore, an appreciable saving can be made by using a rectifier for the B supply whenever house current is available. This midget power supply, made by R. L. Parmenter, provides such a variable B voltage and can be used in conjunction with a dry-cell A supply. Output is variable from 75 to 140 volts. As can be seen from the photos, the complete assembly is hardly larger than a cigarette package.

A bakelite box was fabricated from ¼″ stock and has inside dimensions of 2″ by 2⅜″ by 3½″. Placement of parts is not critical, but it is desirable to leave as much "breathing space" as possible around the rectifier. The 10,000-ohm wire-wound potentiometer which is used as a voltage divider to vary the output potential is mounted on the top panel. Also on this panel are the pilot light and the banana jacks to which the output leads may be connected. The pilot light consists of a midget fuse indicator cemented into a ruby jewel. The limiting resistor that comes with such a light should be left attached and wired into the circuit. A ¼-watt neon bulb may be even more satisfactory for this purpose.

Copyrighted material

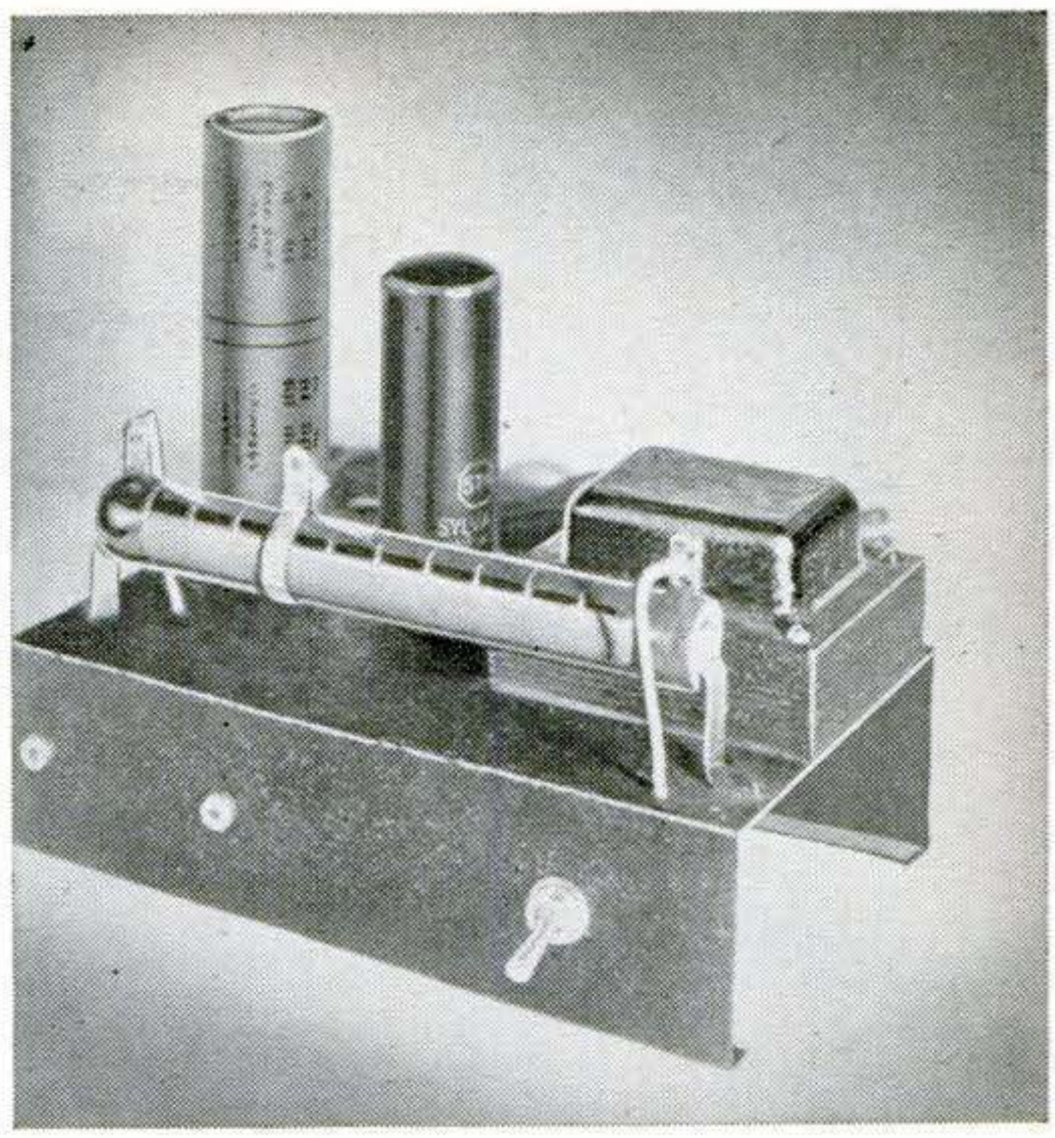
Limits on the amount of current that can be passed by a power supply circuit are set by the rectifier that is selected. The dry disks are available in several current ratings from 75 to 200 ma.; 100 ma. is adequate for most uses to which the supply is likely to be put. To eliminate the ripple that is present after half-wave rectification, a filter choke must be used in conjunction with at least one, and preferably two, filter condensers. The larger the capacity of the input condenser, the higher the output voltage. Also, within certain limits, higher capacity usually results in better filtering. A choke capable of handling from 70 to 100 ma. is desirable in order to make the most efficient use of the rectifier.

The imaginative builder will find many applications for this power supply. Used to provide plate potential for small short-wave regenerative receivers, the variable resistor acts as an auxiliary regeneration control. If the device is to be used with a volt-ohmmeter to increase the range of resistance readings, it may be worthwhile to incorporate some method for checking the available voltage. A voltmeter of 1,000-ohms-per-volt sensitivity connected across the terminals through a switch will allow for continuous checking of the booster voltage.

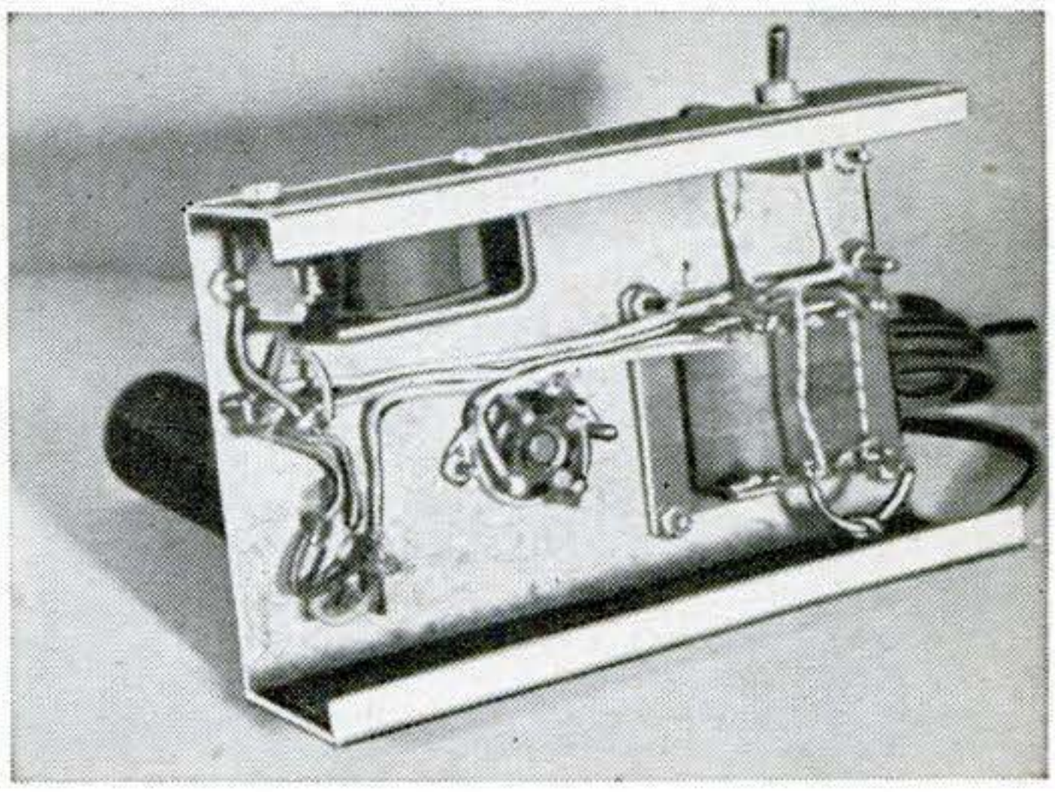
400-Volt Supply

Carl Andresen built this third power supply from his spare-parts box; most of the necessary components can probably be found in the average electrical or radio home workshop. A 2″ by 4″ by 8″ sheet-metal chassis painted with a dark wrinkle-finish enamel was used. Neither the chassis size nor the position of the parts is critical.

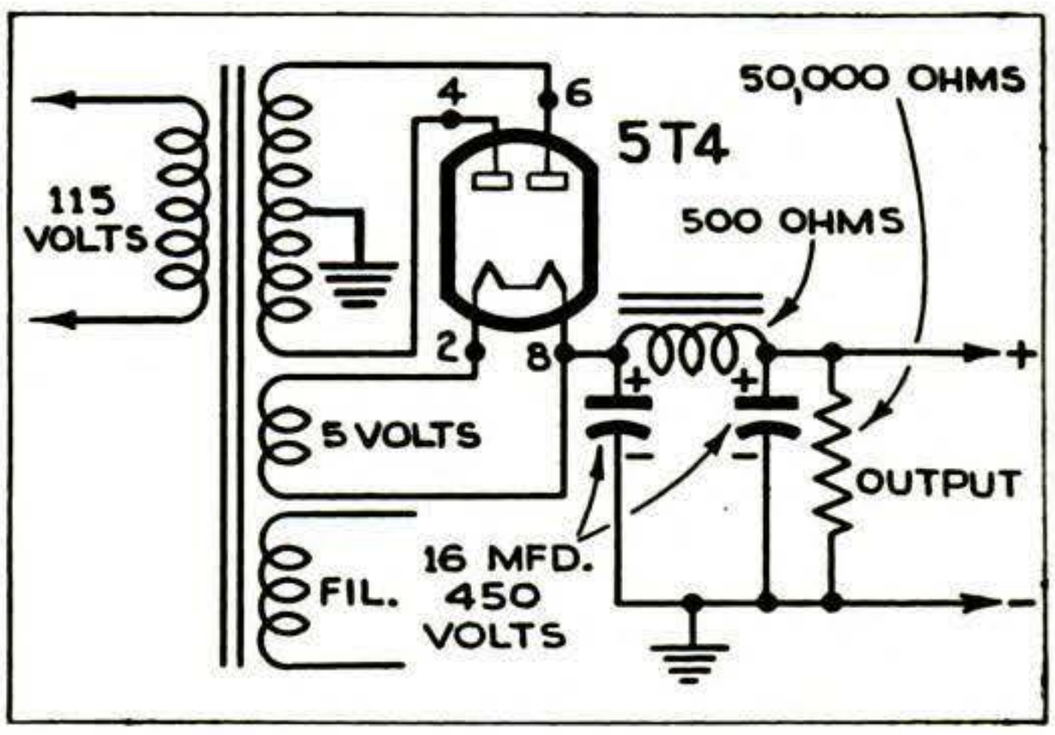
The power transformer, which came out of an old radio, has a high-voltage winding of approximately 500 volts with 250 volts at the center tap. It also has two filament windings, of which only the 5-volt section is used. The 5T4 tube was chosen because it happened to be handy; several other full-wave rectifiers would work as well. For the filter choke the author removed a 500-ohm field coil from a small speaker; the coil and a dual 16-16 mfd., 450-volt electrolytic condenser make up the filter system. A 50,000-ohm, 50-watt bleeder resistance is put across the output to improve voltage regulation. Different voltages may be tapped off the adjustable slide of this resistor. Plugged into a 115-volt 60-cycle line, it should deliver about 400 volts of ripple-free D.C.



The power transformer, full-wave rectifier, dual electrolytic, and bleeder resistor are mounted on top of the 2″ by 4″ by 8″ sheet-metal chassis.



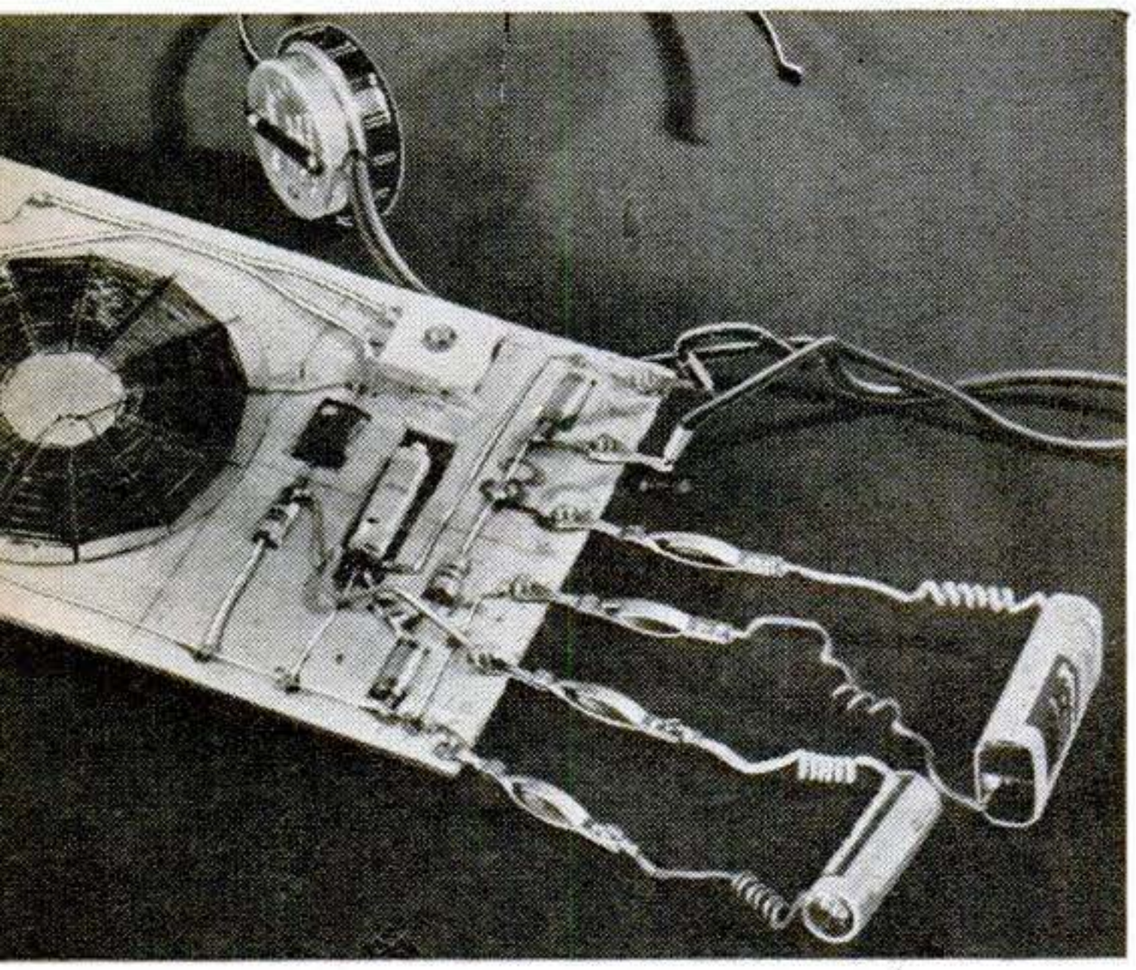
Wiring is done on the underside of the chassis of the 400-volt power supply. The 500-ohm field coil used as a filter choke is also mounted underneath.



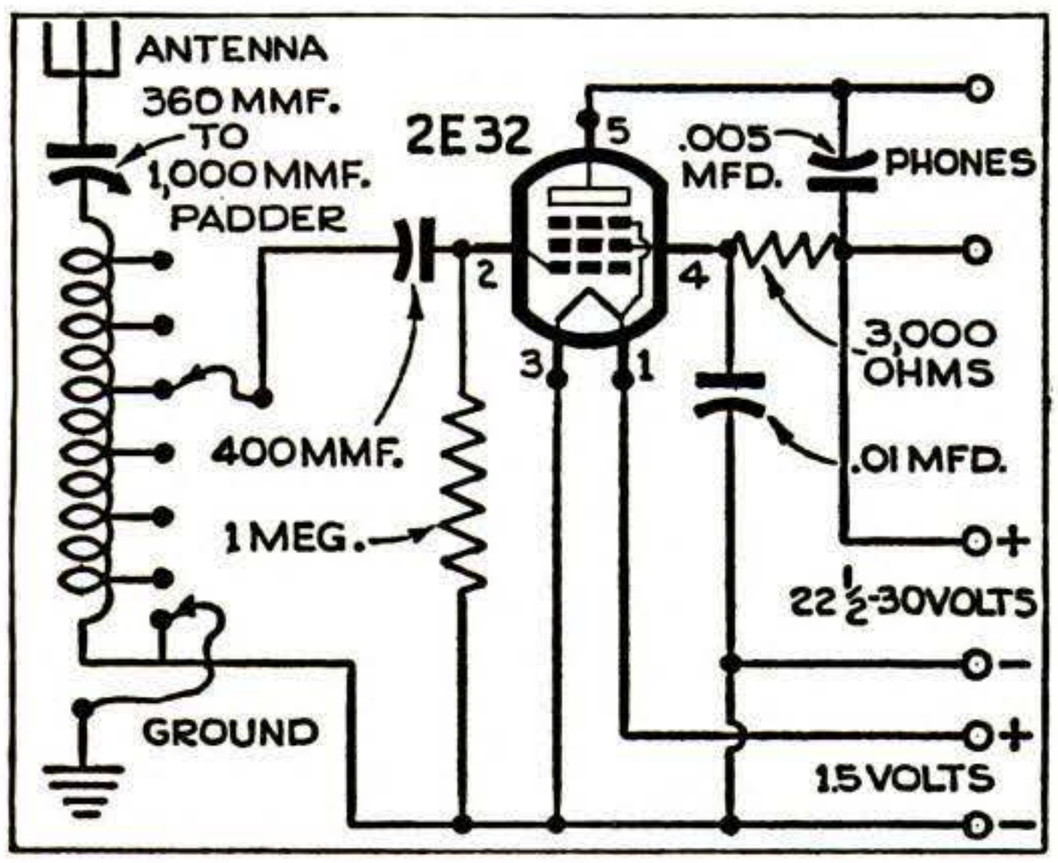
One of the filament windings of the power transformer is left unconnected. The switch shown in the photos is inserted in the transformer primary.

Copyrighted material

Fitting parts into slots in the cardboard chassis makes the set flat and also guards the components.



Small crocodile clips soldered to the various detachable leads permit quick and easy connection.



Resistors are ¼ watt, and the tubular condensers 200 volts; phone impedance should be 2,000 ohms.

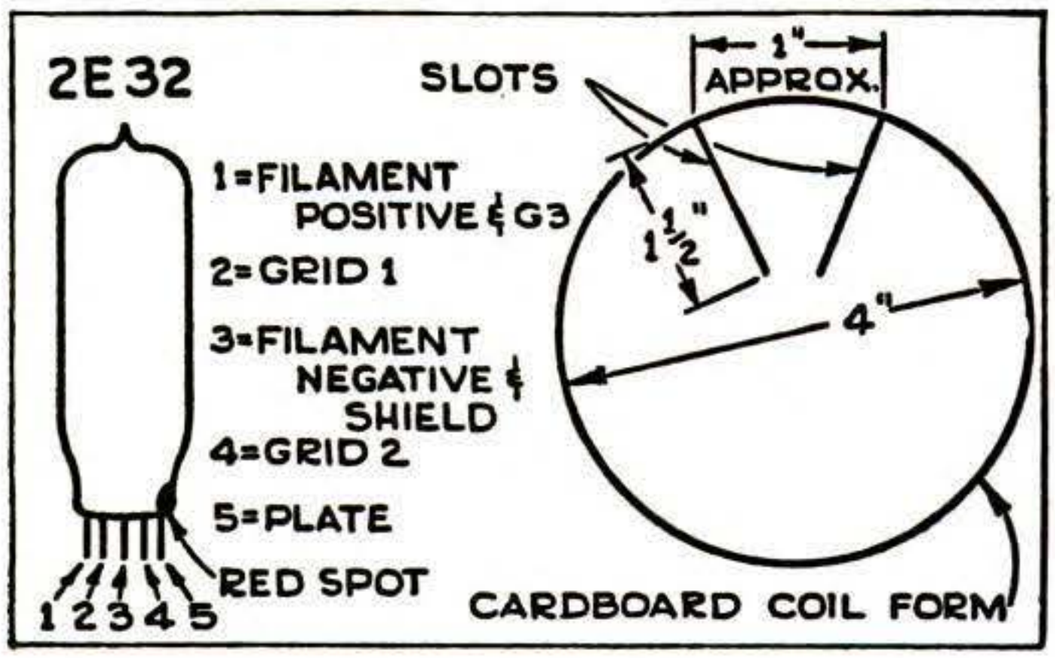
One-Tube Radio Can Be Mailed

SUBMINIATURE tubes measuring less than ¼″ in diameter will make it possible to redesign radio circuits to almost any shape and size. This novelty receiver is as flat as the tube itself and can therefore be inserted in a 6″ by 9″ envelope and sent through the mails as a letter. The two pieces of ⅛″ cardboard that form the chassis are held together by the same nuts and bolts that hold the phone, battery, antenna and ground terminals in place. Slots are cut in the cardboard to clear the components.

The tiny 2E32 tube is a shielded pentode and operates with a plate voltage of 22½ and a filament voltage of 1¼. For the latter, a small flashlight cell will give several hours of useful life. One of the miniature 22½- or 30-volt batteries will supply both the plate and the screen.

To keep the receiver flat, the coil is wound on a cardboard disk 4″ in diameter. Cut 13 slots at intervals of approximately 1″ as shown in the sketch below; then interlace the form with 92 turns of No. 30 enameled wire. At every twelfth turn, make a tap by scraping the enamel and letting a drop of solder adhere to the spot.

Although the circuit doesn't employ regeneration, it has sufficient power to pull in local stations. By selecting the right antenna and ground taps and adjusting the trimmer in the antenna lead, it should be possible to cover the entire broadcast band. The trimmer specified in the drawing is intended for use with a short indoor antenna; if used with a long antenna, a trimmer of lower capacity—say 125 to 350 mmf.—should be substituted.—ALBERT ROWLEY.



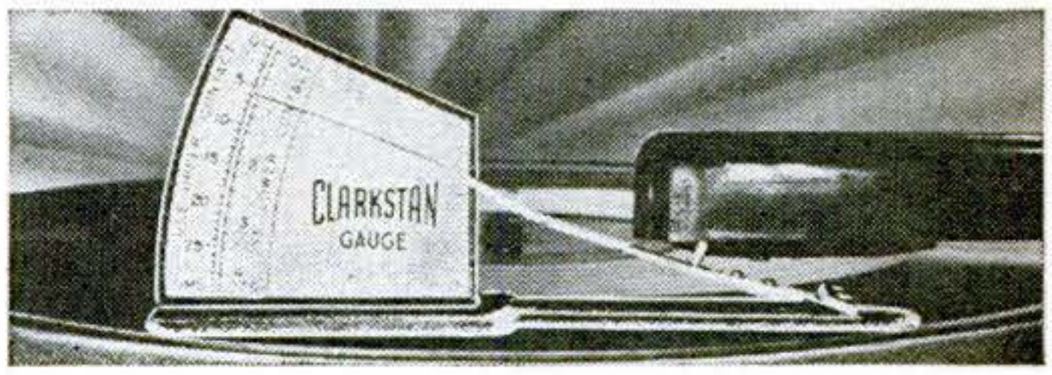
Tube leads may be identified by the position of the red spot. The coil is wound on a cardboard circle.

Copyrighted material

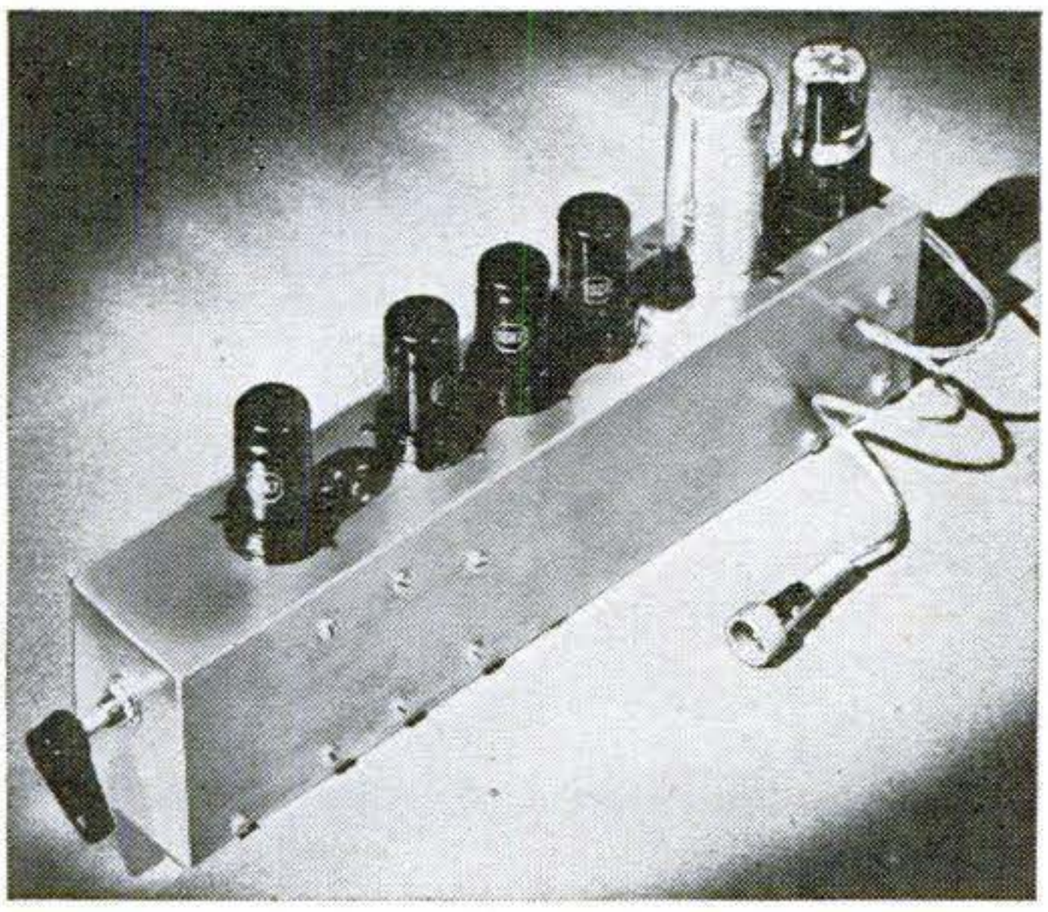
NEWS IN ELECTRONICS

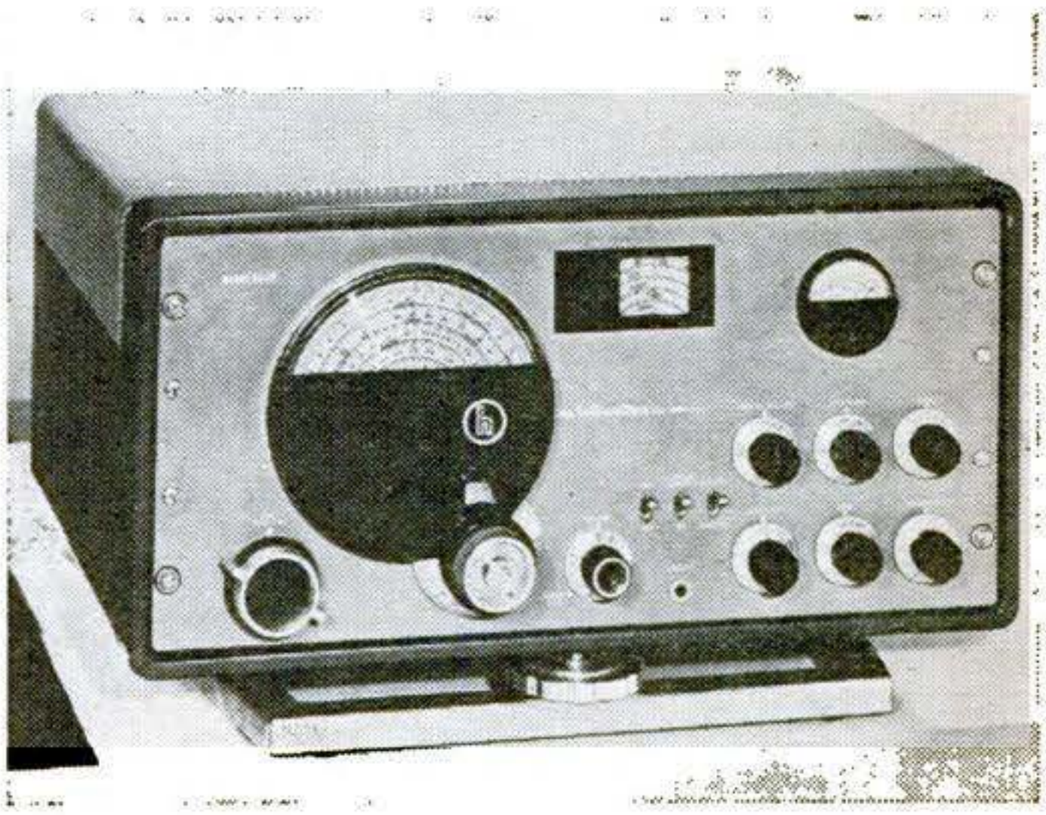
RING TUNER. This complete variable tuner is intended to replace the coil-condenser combination in short-wave receivers, wave meters, low-power transmitters, and the like. Used with a tube whose capacity is 3.5 micromicrofarads, the tuner covers the 140-160 mc. band. It is made by the Clarkstan Corp., of Los Angeles.

NOISE SUPPRESSOR. Radio and phonograph tone controls generally operate by cutting out the frequencies where noise is most prevalent. While they eliminate some noise, they also chop off important parts of the music. Unlike most filters, the circuit invented by H. H. Scott, president of Technology Instrument Corporation, of Waltham, Mass., discriminates against noise without appreciably affecting the desired sound. Gritty background "hash," common on old and worn records, is almost completely eliminated, and high-fidelity recordings come through with a range and quality surprising even to owners of the best previous equipment. The company makes an elaborate model for broadcasting stations; it also licenses the manufacture of smaller units for home use. One such device, pictured below, is made by the Fisher Radio Corporation, of New York, for installation in its radio-phonograph combinations.



NEEDLE-PRESSURE GAUGE. Another Clarkstan product is the needle gauge shown above. It enables repairmen and technicians to measure accurately the pressure of a pick-up needle on a phonograph record. The price of the gauge is $3.

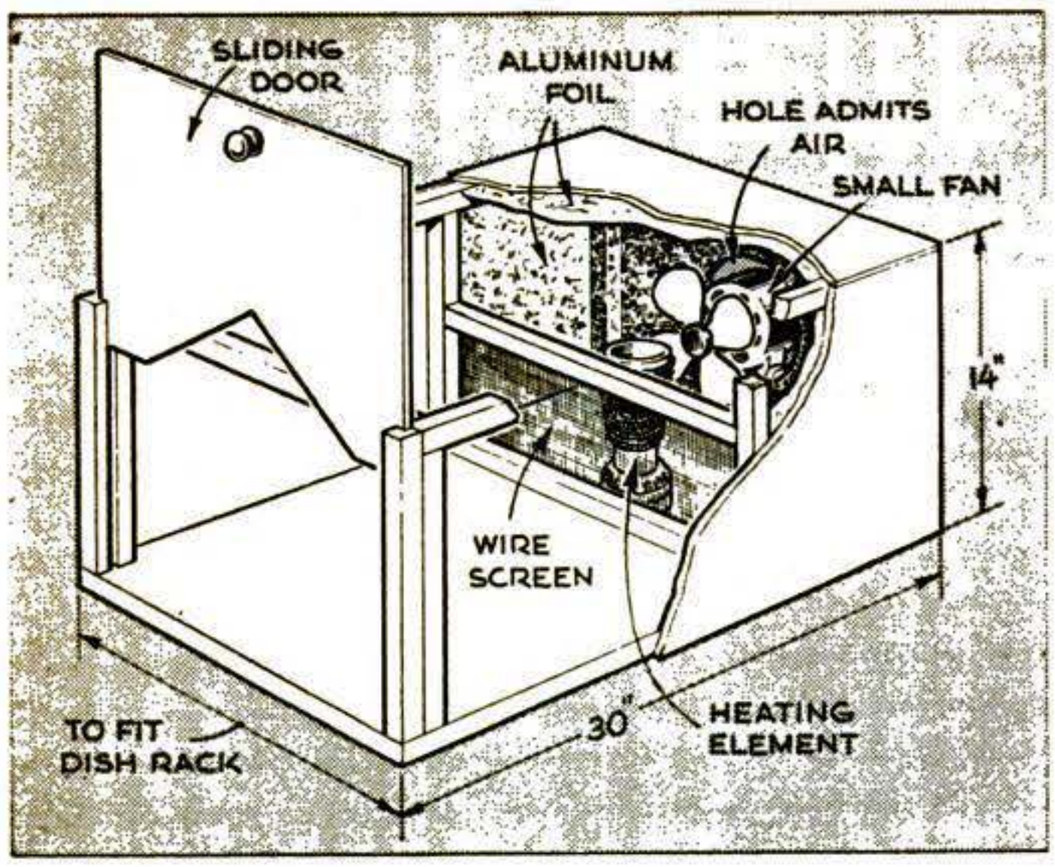


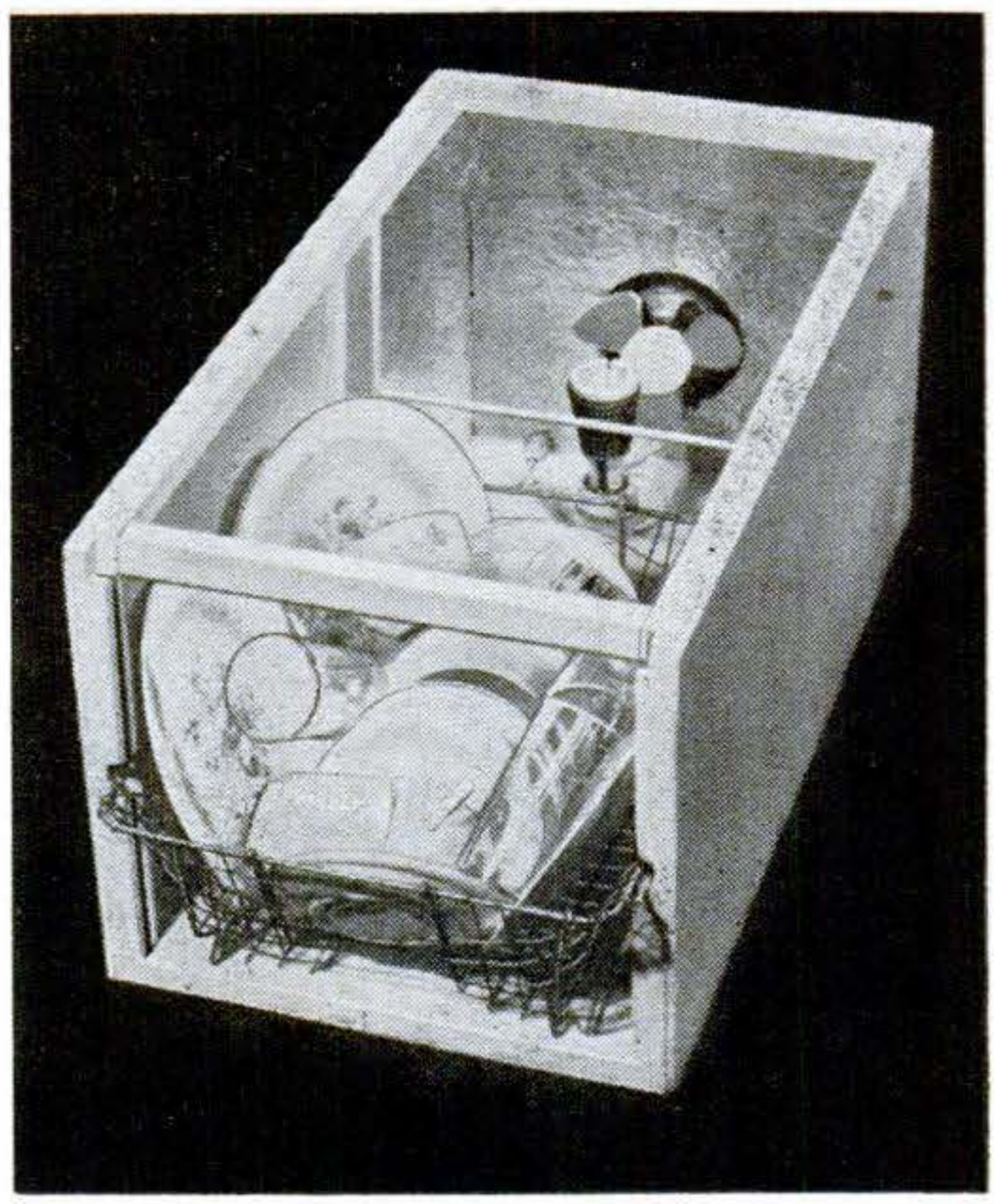


EYE-ANGLE RADIO. Twisting the knurled front rim of the rack on which Hallicrafters' SX-42 receiver stands tilts the set up or down. By making the dials more readable, the accessory increases both comfort and tuning accuracy.

Copyrighted material

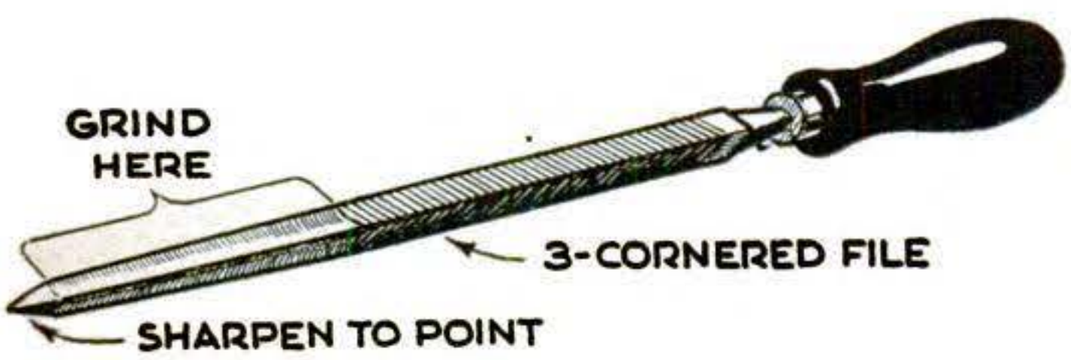
Homemade Electrical Device Dries Dishes and Glasses Speedily





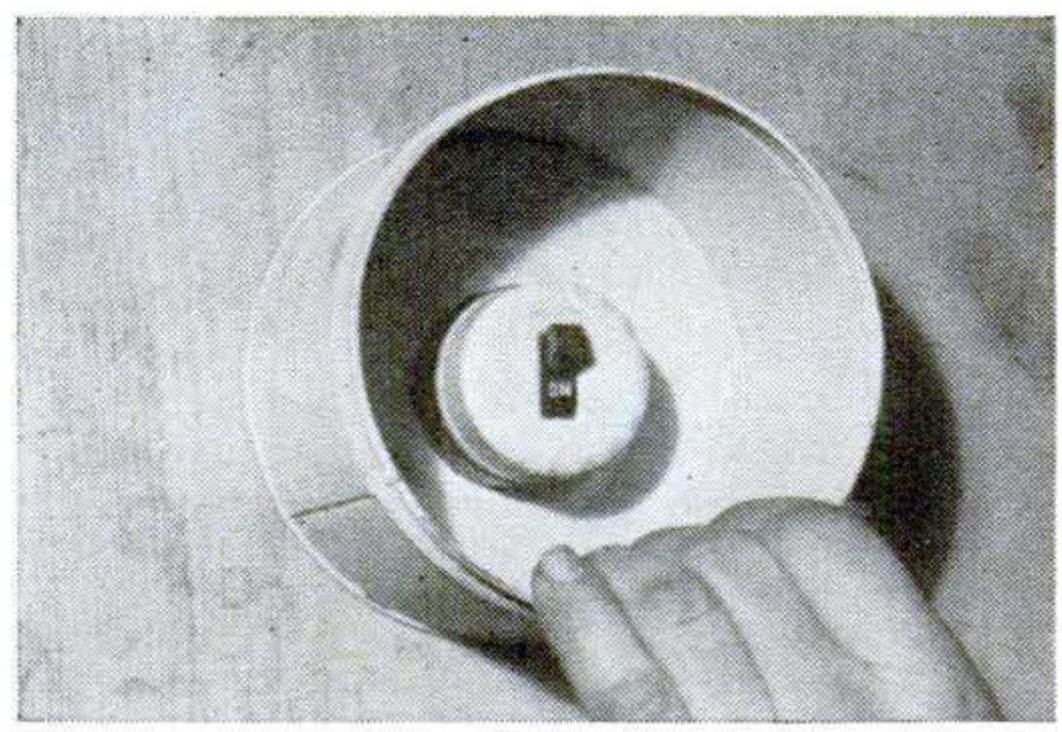
HEATED air from a 600-watt resistance element is blown over wet dishes in this device, which practically eliminates the need for a dish towel in the kitchen. In tests, dishes and glassware rinsed in water at 115 deg., which normally required up to 45 min. for air-drying, were completely dried in about 7 min.

The dryer consists of a box of hard composition board with pine framing, proportioned to take a standard dish rack. A circular hole in the rear and a notch in the sliding front permit the passage of air. The heating element and small fan are wired in parallel and controlled by a switch. Aluminum foil is placed on the interior near the resistance unit, and a wire screen acts as a stop for the dish rack. Take every precaution to guard against shock: use only rubber-covered wire, and tape securely or otherwise protect all connections. Don't use a switch, but control the device by plugging in a heavy-duty plug.—G. S. GARDNER.



File Makes Insulation Scraper

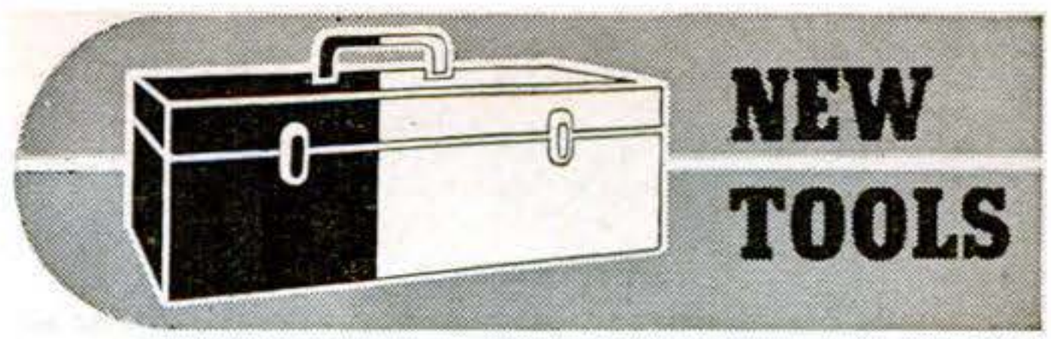
A HANDY insulation scraper for the radio and electrical worker's bench may be made from a worn triangular file. Grind off all teeth from the three sides for a distance of about 3", holding it against the wheel in such a way as to leave a slightly concave face on each side. The edges produced will be quite sharp but may be whetted on a small handstone for still greater keenness. If in addition the tip is ground to a tapering point, the tool will be useful for starting woodscrews and for enlarging and burring small holes that have been drilled or punched in sheet metal.—HERBERT SPOHN.

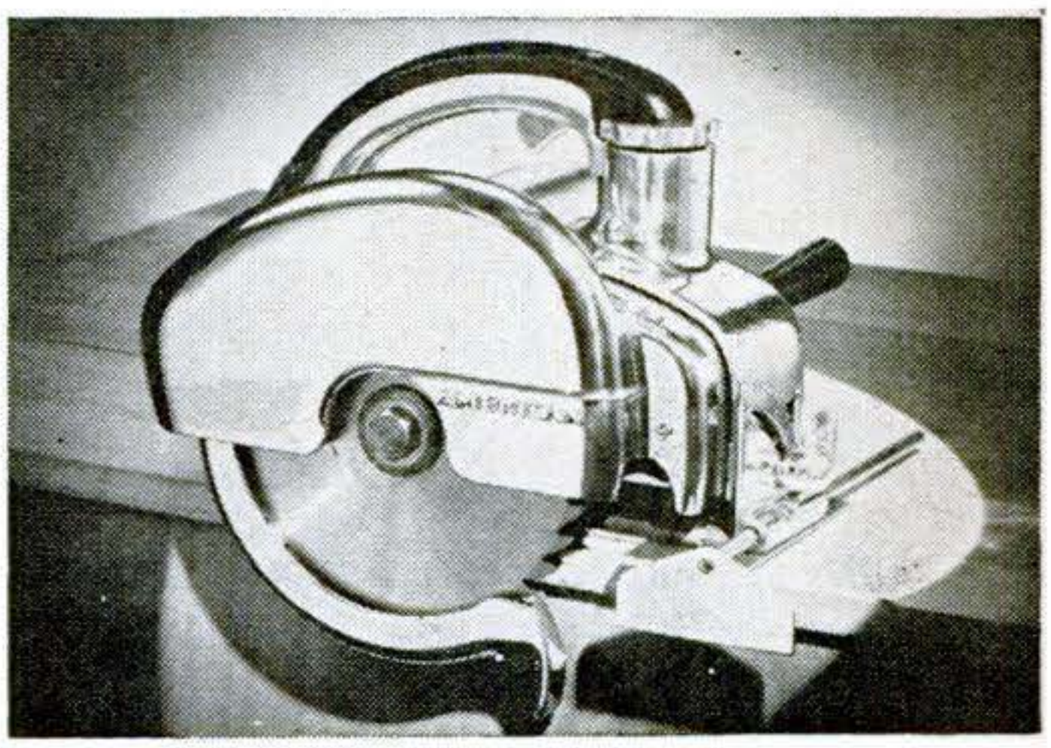


Can Protects Outdoor Switch

GARAGE and outbuilding switches that are directly exposed to the weather or are on porches or similar locations that rain may reach can be protected with old coffee cans. Use the kind with a screw-on lid, and paint well to prevent rusting. The switch is mounted and wired through holes punched in the can bottom.—IVAN GROSVENOR.

Copyrighted material

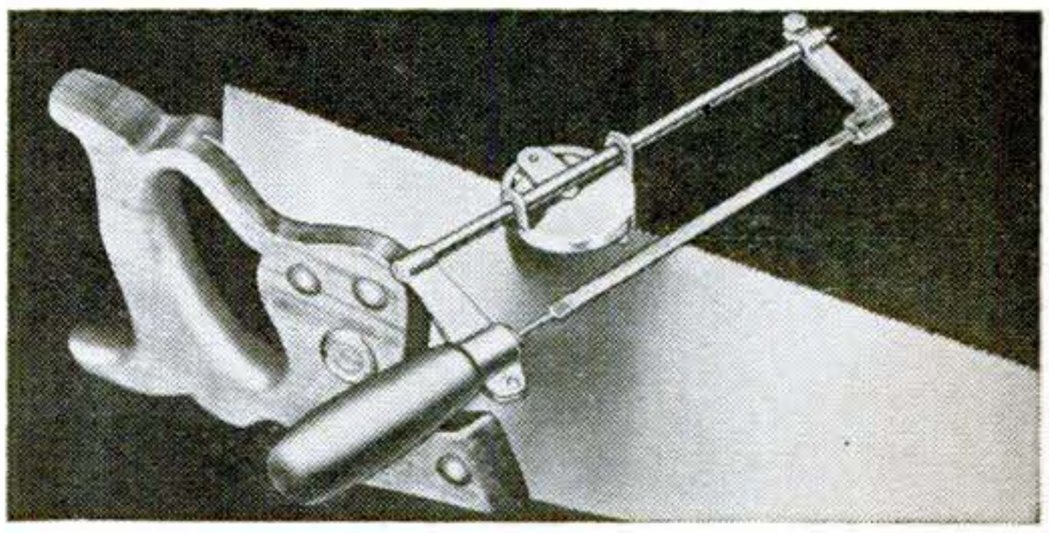


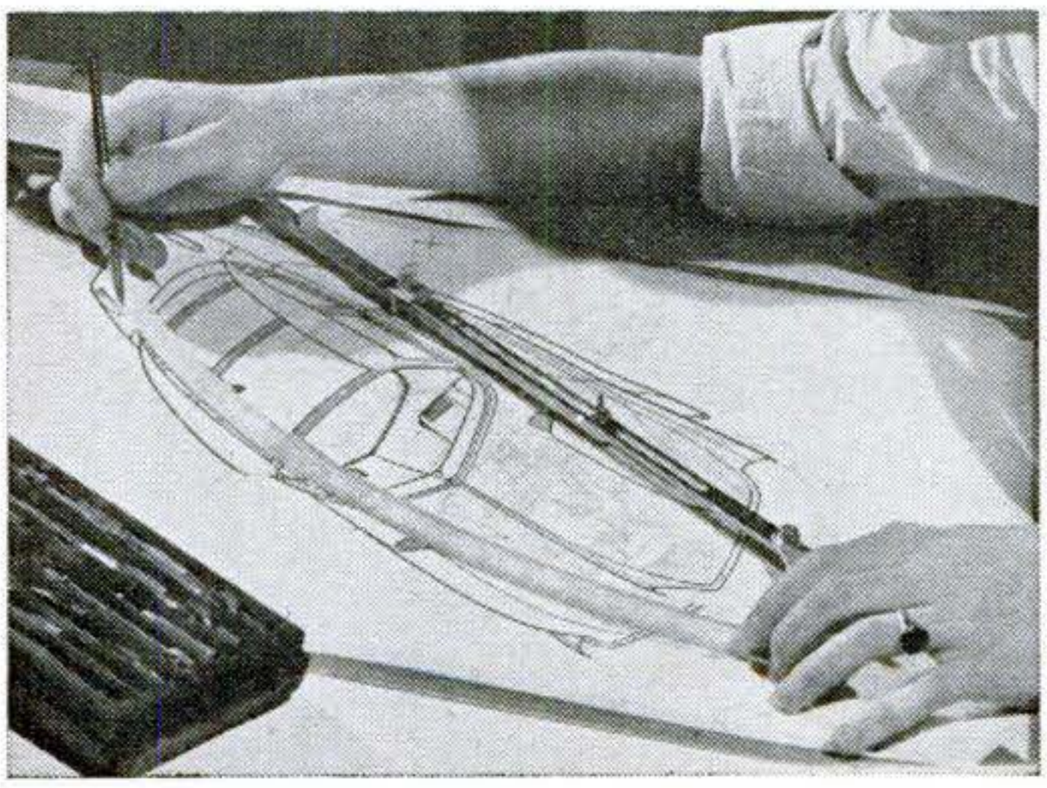


PORTABLE ELECTRIC SAW. This new product of the American Floor Surfacing Machine Co., of Toledo, Ohio, has an 8″ blade driven by a 1½-hp. motor. Its free-running speed is 6,500 r.p.m. A screw-thread adjustment regulates depth of cut to a maximum, for a straight cut, of 2⅞″. Although it is designed for one-hand operation, a second handle is provided as a convenience in vertical sawing.

ANGLE VISE. An all-angle vise suitable for die, gauge, and fixture drilling, also for grinding, is supplied by the Machinist Tool Company, of Chicago. It can be used on machine tools as well as on the bench. Hardened and ground jaws are available in both parallel and V-grooved types. The vise has a 2¾″ lateral clearance, swivels 360 deg. on its base, and has a 90-deg. vertical angle adjustment.

SAW FILER. An attachment that will enable home craftsmen to sharpen saws quickly and accurately is made by the Speed Corp., of Portland, Ore. The tool locks into position on the saw, as shown in the photo below, and automatically guides the file. Two adjustments adapt the device to any type of hand saw.





FOR DRAWING CURVES. Adjustable for a wide range of arcs and irregular curves, this drafting instrument, which comes in 1½′ and 2′ sizes, will form arcs from infinite radius down to 10″ and 1′ respectively. It is particularly useful for drawing arcs of very large radius where the center of a beam compass falls outside the drafting table. Albert G. Daniels, of Winnsboro, S. C., makes the device.

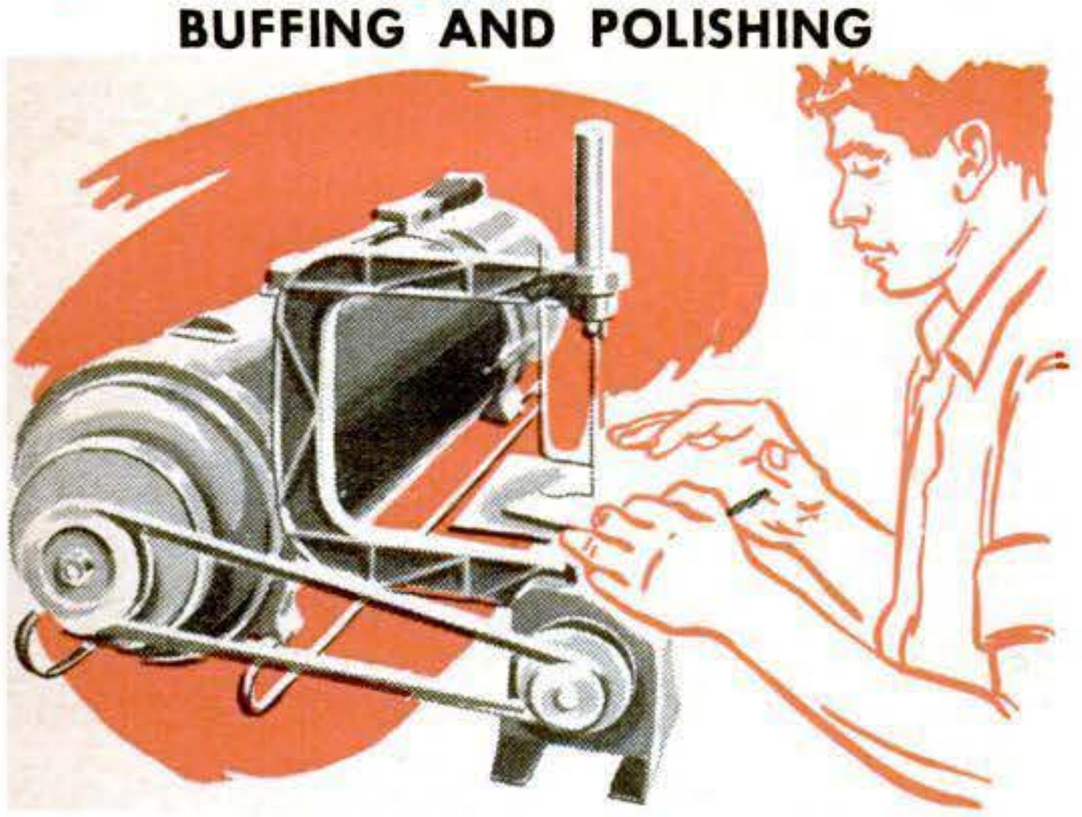
Copyrighted material

Vacuum Cleaner

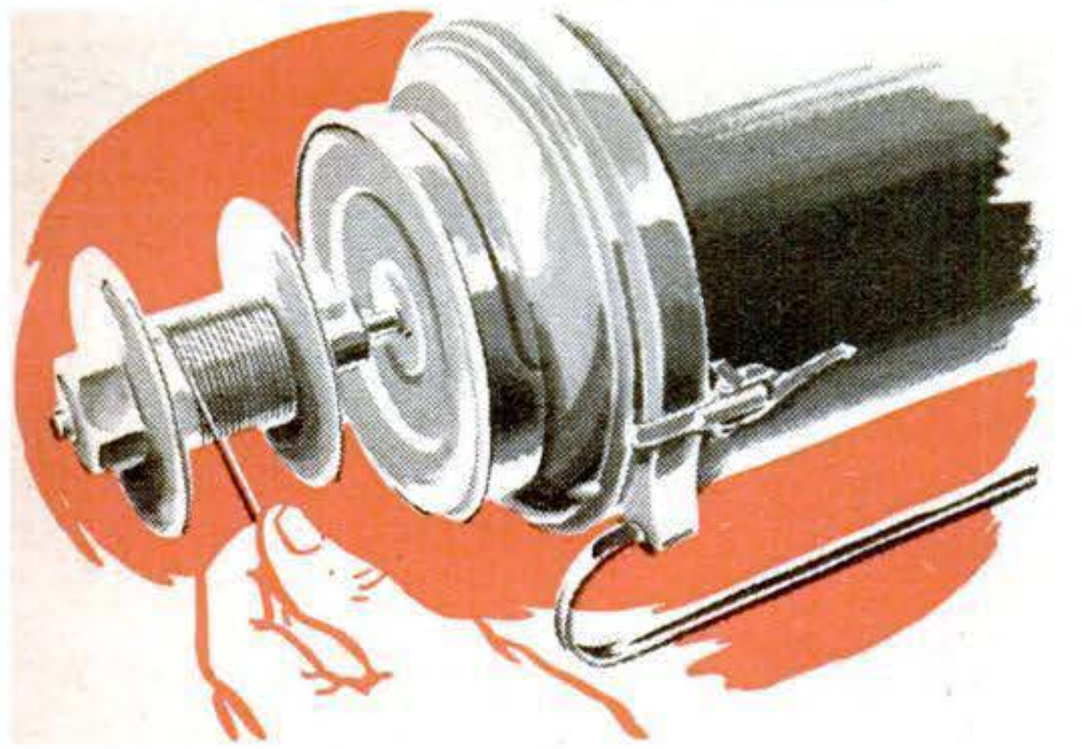
By Harold P. Strand

FLEXIBLE-SHAFT CARVING

BUFFING AND POLISHING



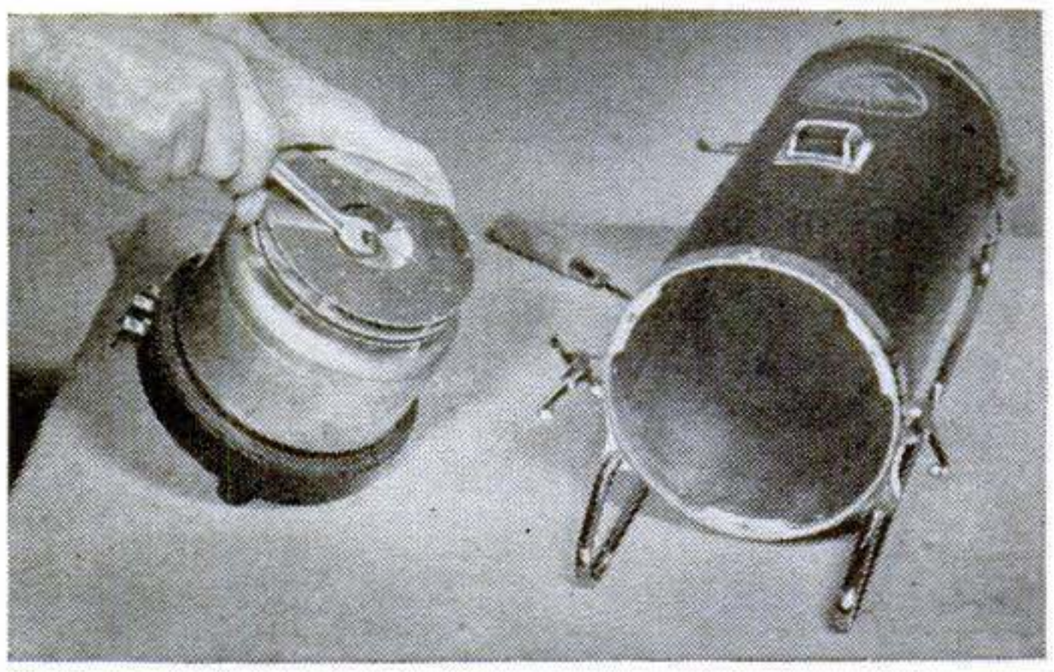
POWERING SMALL TOOLS



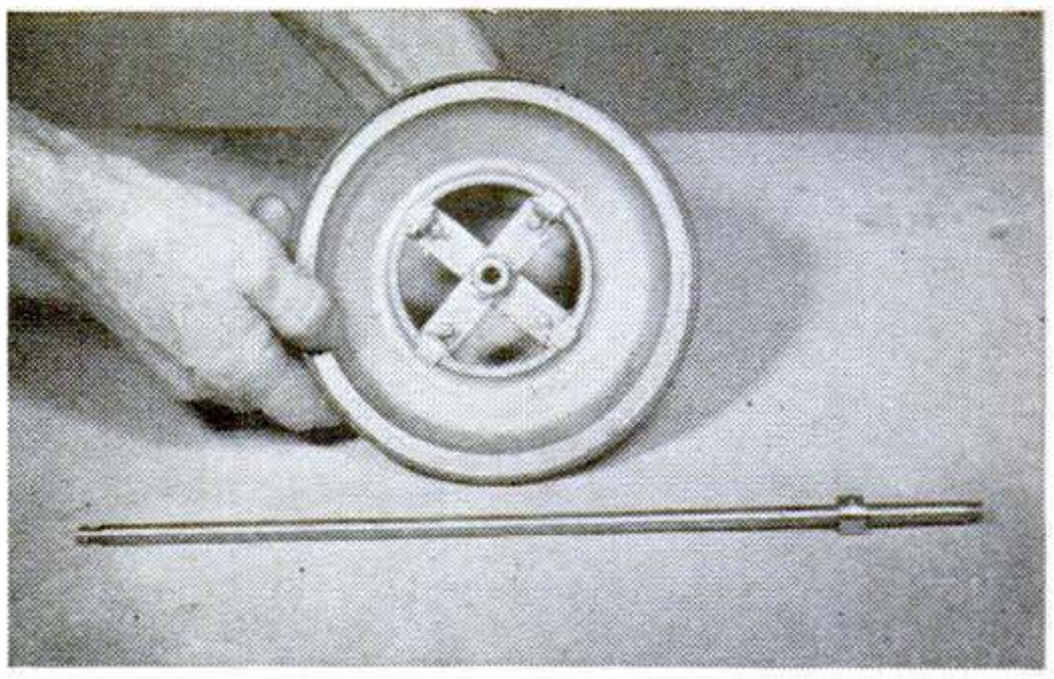
WINDING COILS

YOUR tank-type vacuum cleaner can be converted into a versatile power unit with numerous uses in both kitchen and workshop. Fitted with an extension shaft and arbor, it will take a small grinding wheel for sharpening knives or tools, or a buffing wheel for polishing household silver and metal craftwork. Depending on your equipment and needs, it will also lend itself to many other tasks—driving a flexible-shaft carving tool, for example, or operating light-duty power tools such as a jeweler's lathe or jigsaw.

Conversion doesn't impair the usefulness of the cleaner; the extension shaft may be speedily removed when cleaning is to be done. One end of the shaft fits into a special stud that replaces the original fan-retaining nut, and the other end extends through a bearing on the suction end of the tank. This



Keeping the fans from turning with your left hand, unscrew and discard the original fan-retaining nut.



Rear view of the modified cover. The collar on the shaft is so located as to keep the pin in the stud.

Copyrighted material

Doubles as a Power Tool

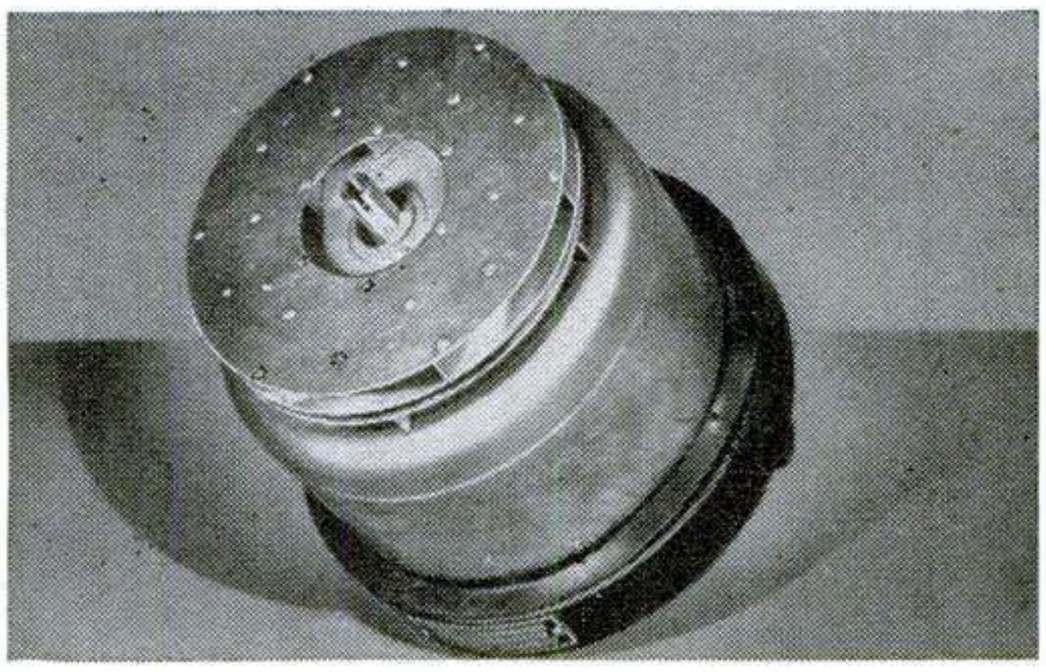
bearing is held in the aluminum cover cap in such a way that it can be removed without damage to the cap; but for convenience in changing between power and cleaning applications, a second end cap can be obtained from a vacuum-cleaner repair shop. With this spare cap, you'll be able to switch between types of duty in a matter of seconds.

First step in modifying the cleaner is to remove the motor and fan unit. In the model shown, this involves taking off the two outside covers over the commutator end of the motor, and removing three screws in the bakelite rim. This frees the motor from the tank, and after a screw at the switch is removed, the whole unit can be withdrawn.

Take off the housing over the fans and unscrew the fan-retaining nut, which should be replaced with a threaded, slotted stud as shown in the drawing on page 214. This stud, made up from cold-rolled hex stock, should be turned, threaded, and slotted as accurately as possible to minimize vibration. The thread on the motor shaft should also be matched as precisely as possible; the one on the motor shown appeared to be a special thread a few thousandths under ¼″-32, but a satisfactory job was done with a ¼″-32 tap by not passing it far enough into the stud to cut a full-depth thread. Cut a clearance hole in the fan housing and replace it.

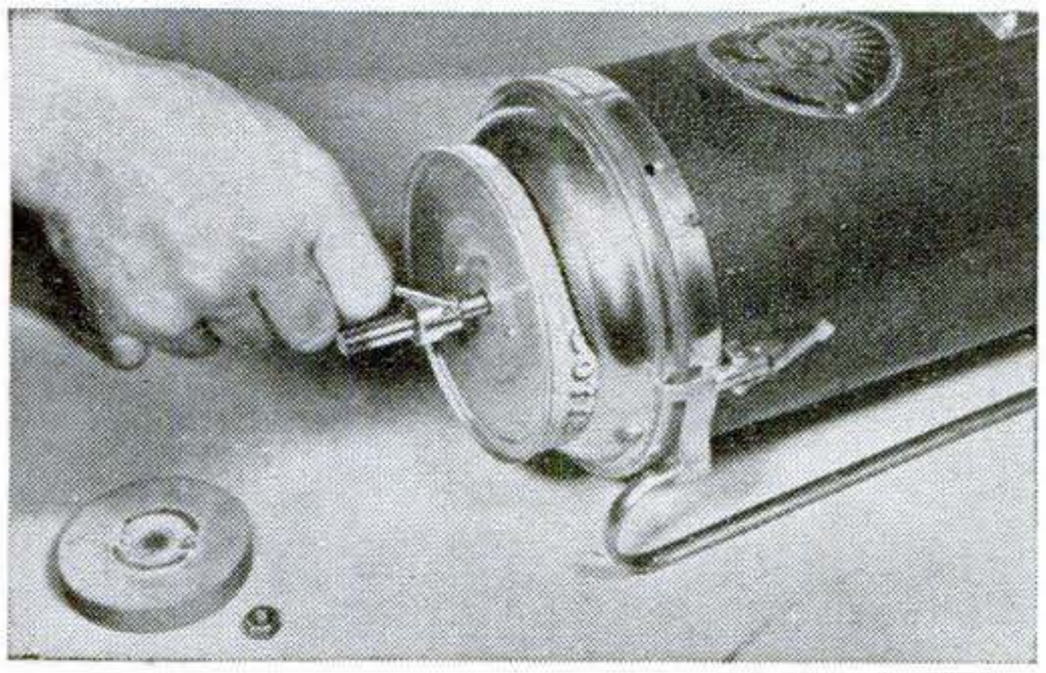
For the new shaft, cut a length of 5/16″ drill rod to project about 1½″ beyond the end cap, a length of about 14″ on the cleaner shown. Turn down and drive a pin in one end as specified in the drawing, and thread the other end 5/16″-24 for possible use in driving an attachment. Before replacing the motor unit in the tank, check the fit of the shaft and the slotted stud; they should interlock lightly but with no backlash.

The outer bearing on the end cover is made of two pieces of brass bent as shown to fit snugly in the opening. They are placed



Replace the nut with this special slotted, threaded stud that both holds the fans and drives the shaft.

A hole must be punched in the perforated guard in order to permit the new shaft to fit in the stud.



With the tin-can dust shield in place, the threaded shoulder arbor is attached to the extension shaft.

A simple movable-core reactor affords one easy way to regulate the shaft speed for any particular job.

Copyrighted material

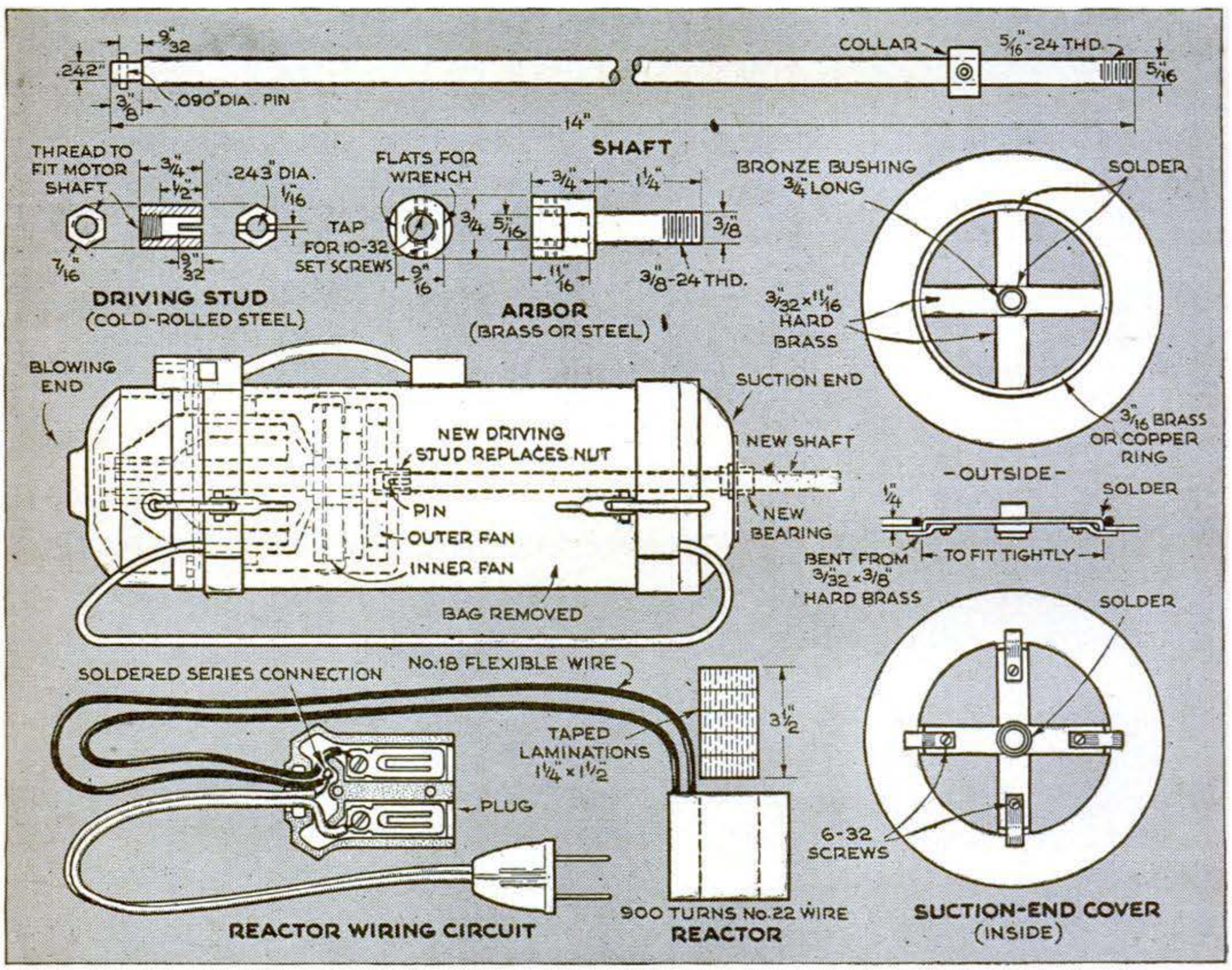
in the form of a cross and soldered securely together, and drilled at the center to take a bronze bushing, which is soldered in place and reamed 5/16". A brass or copper ring is soldered at the ends of the crossed pieces to fit them tightly against the cover and keep them from sliding through. Four brass clips, held on the inside with 6-32 screws, hold the assembly in place.

If the cover fits the tank loosely, as it probably will without the dirt-bag gasket to bear against, a special gasket can be cut from an old inner tube or a band of adhesive tape put over the edge of the cover. Oil the bearing and test the shaft for free turning. Tapping the cover may aid alignment.

An arbor, turned as specified in the drawing, will provide a shoulder against which grinding or buffing wheels can be held. Cut out the bottom of a tin can and screw it against the end to protect the motor from the grit of grinding and buffing. Leave a small slot to admit cooling air to the motor.

The cleaner shown is rated on its nameplate at 350 watts, and this and newer models are entirely suitable for conversion. However, one early model, rated at about 150 watts, would probably not deliver much useful power. Vacuum-cleaner motors, almost always a series-wound or universal type, normally turn at high speeds. Running with no load other than the fans, the motor will turn at speeds up to 10,000 r. p. m., which is too high for most power applications. (Never run the motor *without* the fans or other limiting load.) The practical solution is to run the motor at less than full line voltage by putting either a resistor or (on A. C.) a reactor in series with it.

Shown below are details of a simple reactor that, with the iron core fully inserted, will cut the speed approximately in half. A rheostat capable of handling the motor current will also serve well, and is particularly suited where speed regulation is desired over a wide range, as for instance coil-winding at one extreme and buffing at the other. Less flexible in controlling speed but very simple is the expedient of wiring a lamp socket in series with the motor; lamps of 75-, 100-, or 150-watt rating can then be screwed into the socket to produce varying motor speeds.

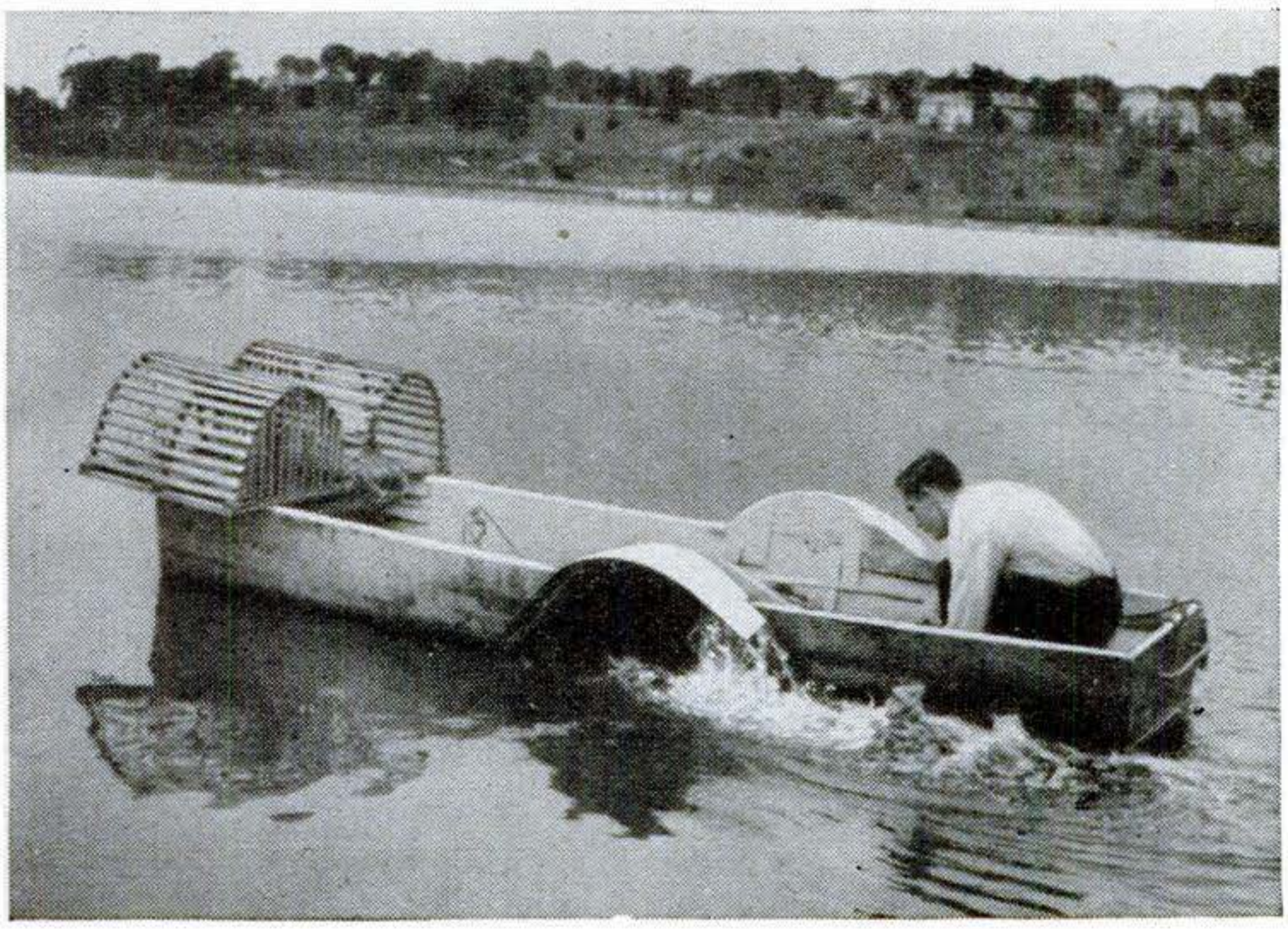


Before making the stud, bearing, or shaft, check your own cleaner to see if these dimensions will apply.

Copyrighted material

Back-Yard Boat Builders

THREE-DAY BOAT. Needing a tender to reach his 18′ auxiliary moored off Staten Island, Frank R. Herbert, of Eltingville, N.Y., set to work on an 8′ pram-type boat. In just three days, he had completed the job, attached a 2-hp. outboard, and put the boat in service. The tender has a 4′ beam, with frames, stem, and transom of oak. Waterproof gum plywood, screw-fastened and calked with glue, forms the sides and bottom. Corner pieces of mahogany were put in for stiffening, and a white cotton rope was added along the rail to serve as a bumper to protect the auxiliary.



SIDE-WHEELER. An old ½-hp. gasoline engine taken from a discarded washing machine powers the 20″ paddles on the sides of this odd-looking boat. The vessel, a 12-footer, was built by Raymond E. Goan, of South Portland, Me., for hauling in his lobster pots. Goan, a 25-year-old veteran of the Navy, finds it does its job well in spite of its antique appearance. He calls the craft the smallest side-wheeler in use.

Copyrighted material

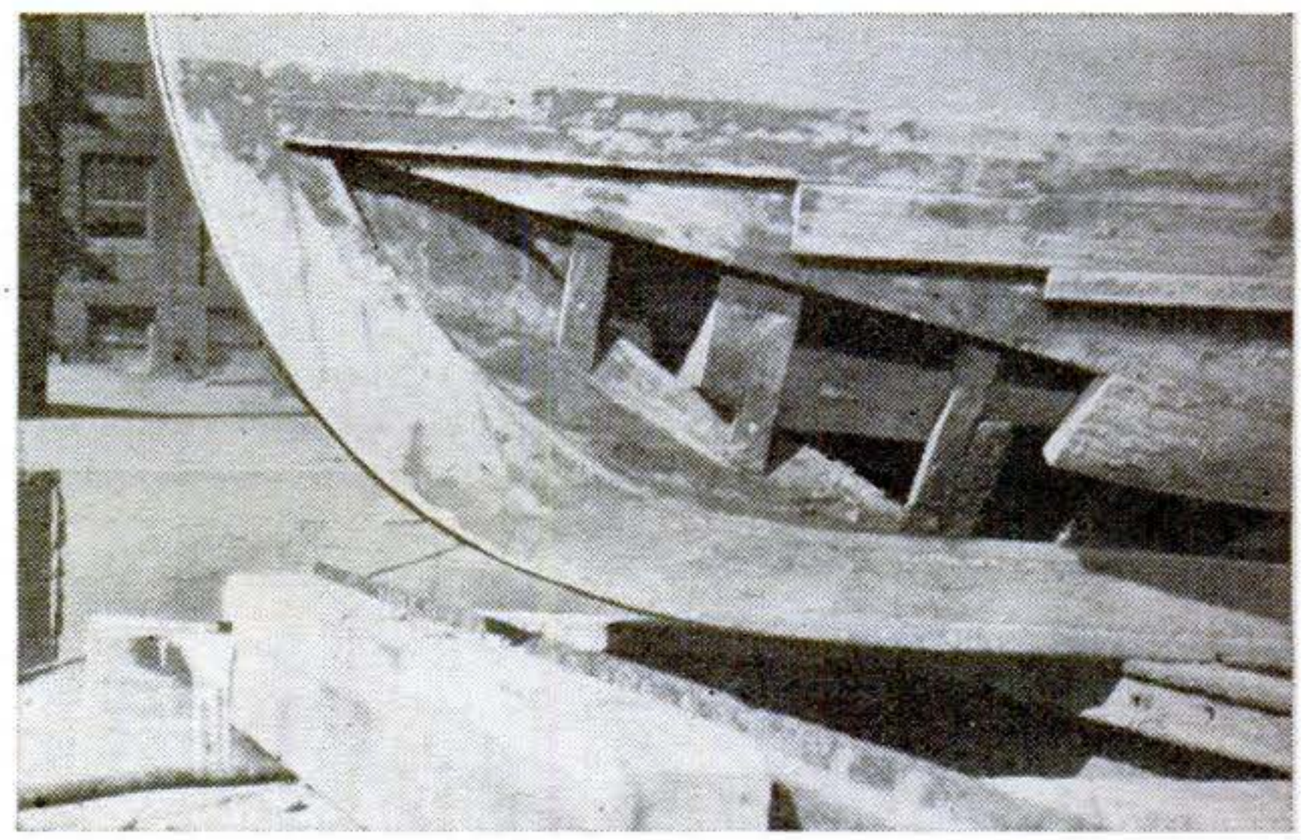
Steam-Bending as

WHEN a broken frame in a round-bottom boat must be replaced or reinforced, or a section of the planking has to be taken out and new pieces put in, one of the main differences between boat building and house building becomes immediately apparent. Houses are built in straight lines and angles. Boats are all curves. You'll even run up against double-twisters, known to the uninitiated as compound curves.

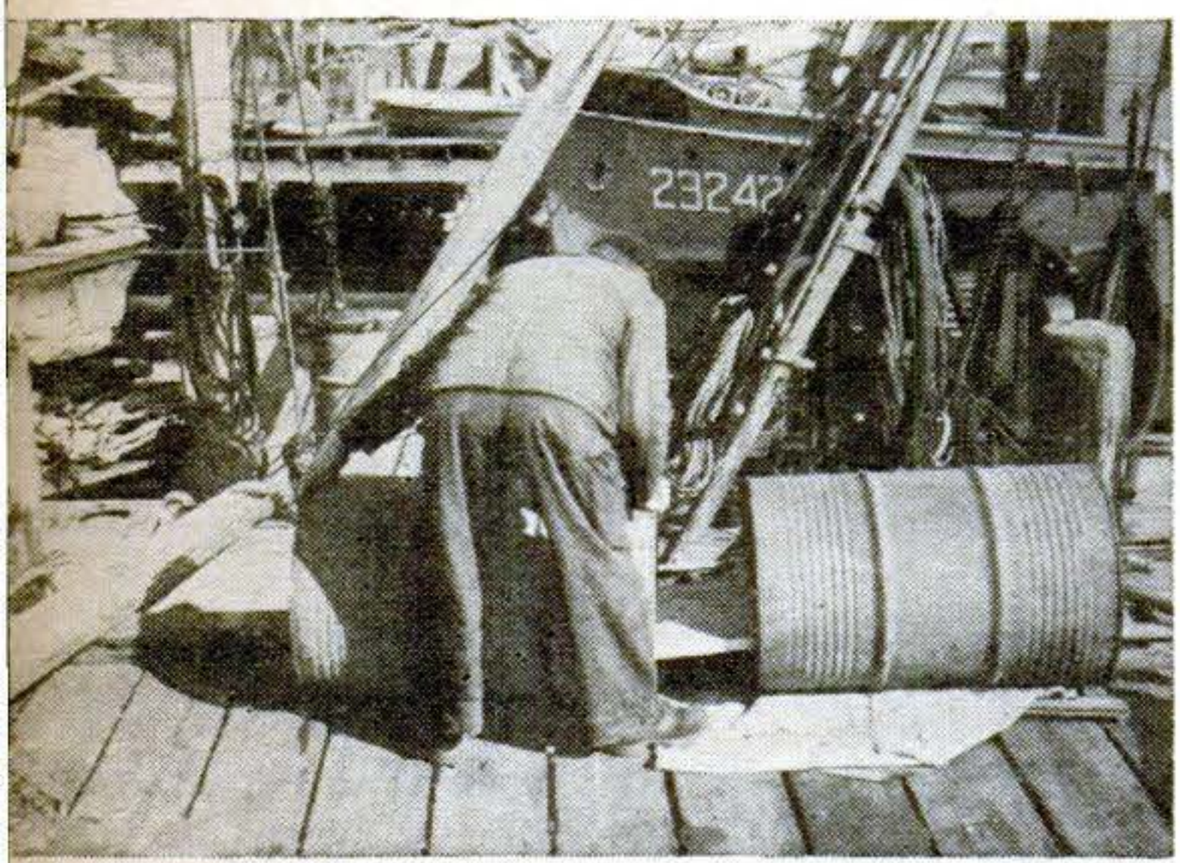
Often, in the case of planking, it is possible to bend the piece by hand and clamp pressure. But this won't do if the planking is thick and short, especially if it is in the bow section. Then you need steam.

No special difficulty need be experienced once you understand the job to be done and have the equipment, which may be a simple steam box, such as a discarded boiler, and some means of boiling water in it or admitting steam. Professional builders seem to prefer softening wood to be curved by saturation in steam alone, but some go in for a combination steam and hot-water soak-

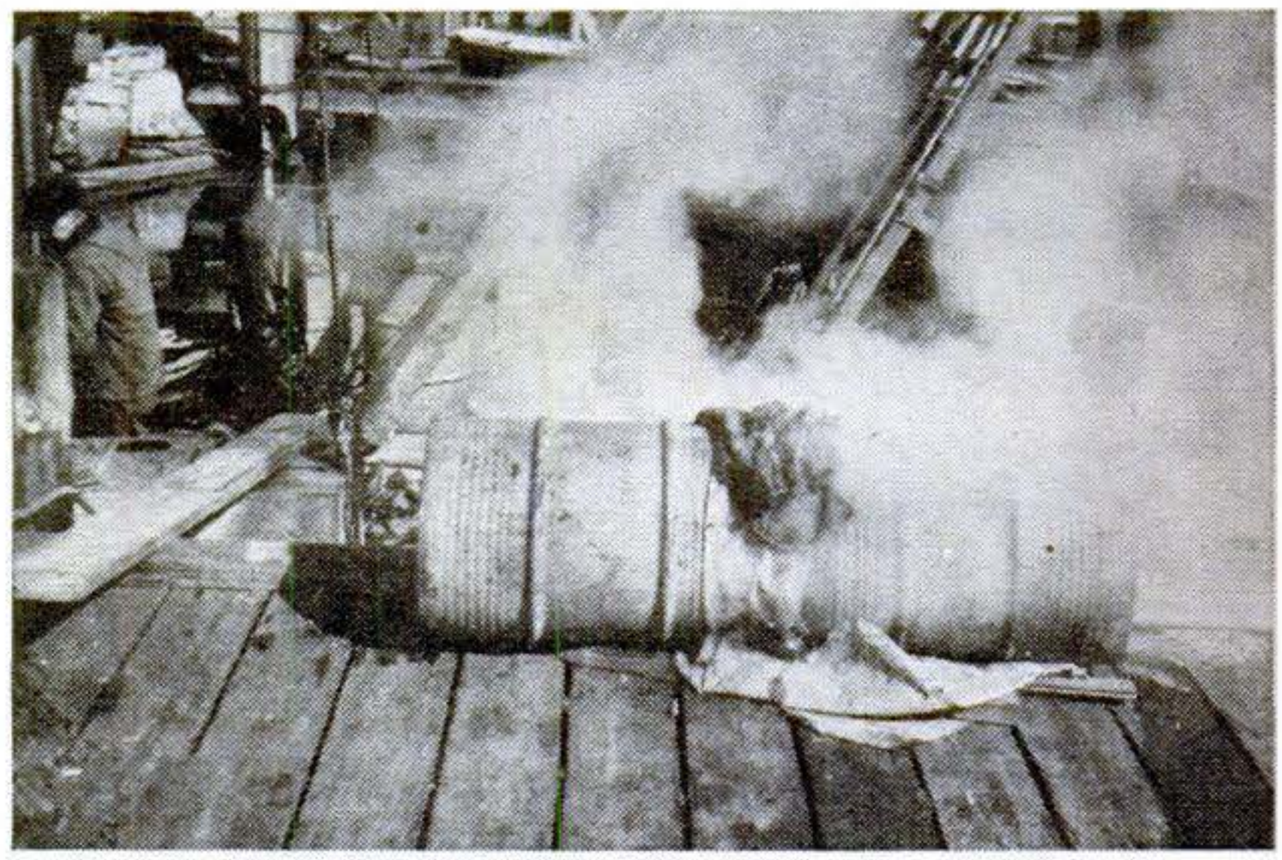
1 Here's the job. Two heavy, short pieces of planking a full 1¼" thick had to be shaped **to patch a stove-in hull section. It required** steam-bending, not hard if you know how.



2 Sheathing is removed from over the damaged planking in the bow, and the old planking is carefully sawed out to firm wood. Use care in the sawing, for the old pieces will serve as patterns for the new.



5 Two empty 50-gal. oil drums serve as the **steam box, one piece of new planking is put in them, and they are pulled together.**



6 Here steam is piped in by hose from a near-by boiler. The joint between drums is covered with an old tarpaulin. An hour's steaming may do.

Copyrighted material

the Experts Do It

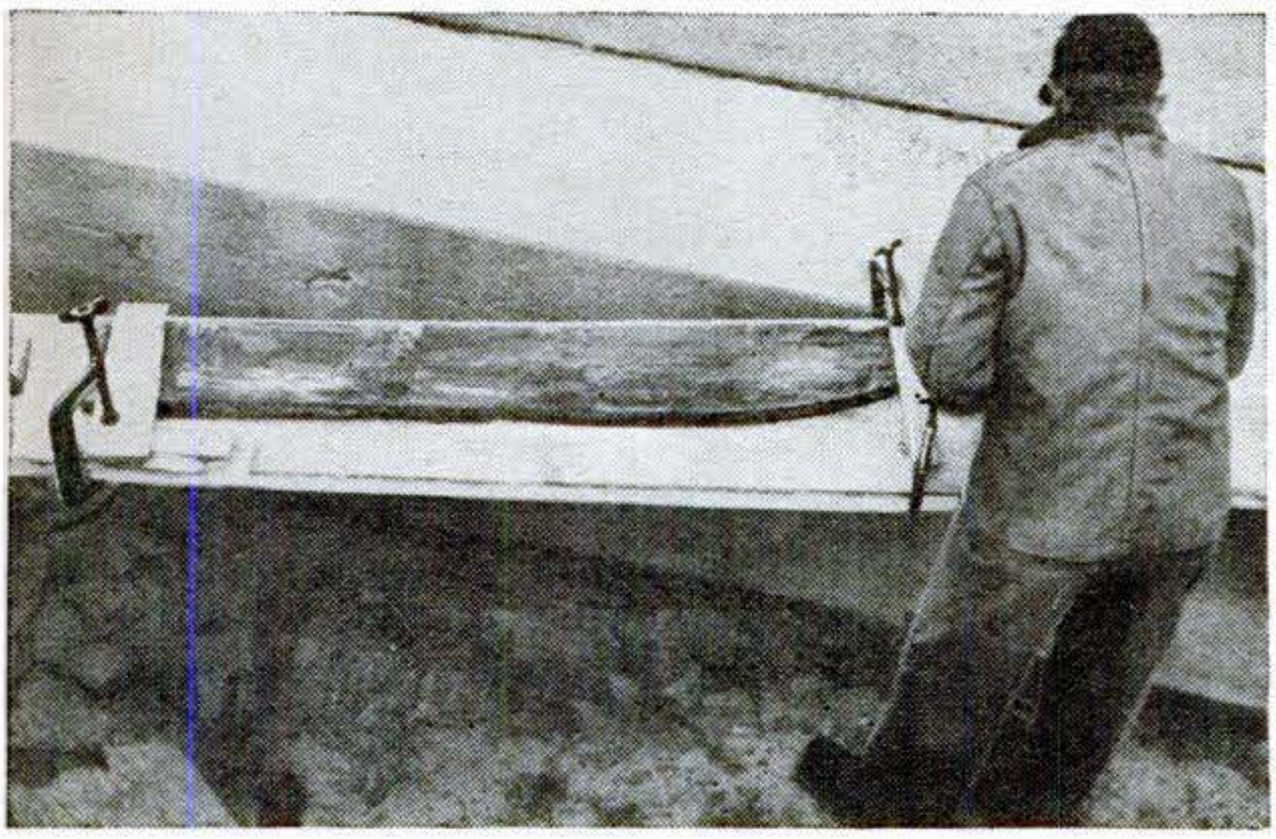
By Elon Jessup

ing. Hot water by itself will do in a pinch.

Bending may proceed in either of two ways after the wood has been softened. One is to nail it while pliable right on the boat—but this is a rush job, for the wood soon cools and stiffens. A more leisurely way is to bend with clamps, blocks, and wedges while the wood is hot, and then to fasten the piece in place when it has cooled. This is especially good with thick planking, but frames may fit better if bent directly into the average small boat.

The planking of the boat shown was a full 1¼″ thick, and the position in the bow of the repair called for considerable twist. In spite of this, the job was accomplished with a simple improvised rig. Steam from a near-by pile driver was conducted through rubber hose to a steam box consisting of two drums, each having one end open and covered at the joint with a tarpaulin.

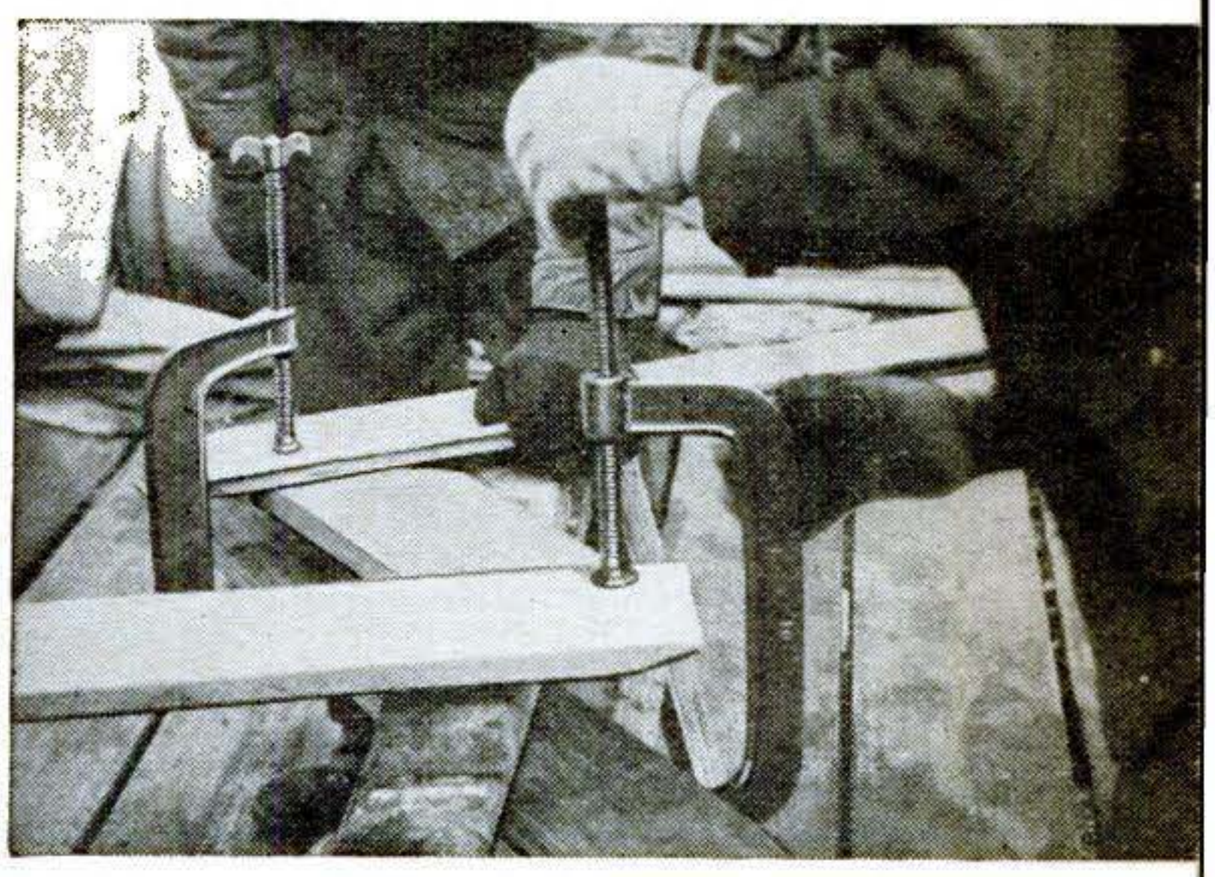
Two other means of improvising steam boxes are shown in drawings. If more convenient, the drainpipe may be tilted and



3 Clamped to the new wood, an old section of removed planking forms a template for an accurate outline. Mark the shape of each piece to be replaced, and saw to the line so the patch will be a good fit.

4 Another use is found for the old planking. It is laid out on a sawhorse, its center of twist studied, and is blocked up with wedges to give correct curve to the new piece.

7 Fast work is needed in bending. The steamed wood is put on the blocks and wedges of the improvised press and clamped down quickly under crosspieces.



8 C-clamps play an important part in bending. Have plenty in reach and, once they're set, don't release until the wood is cold.

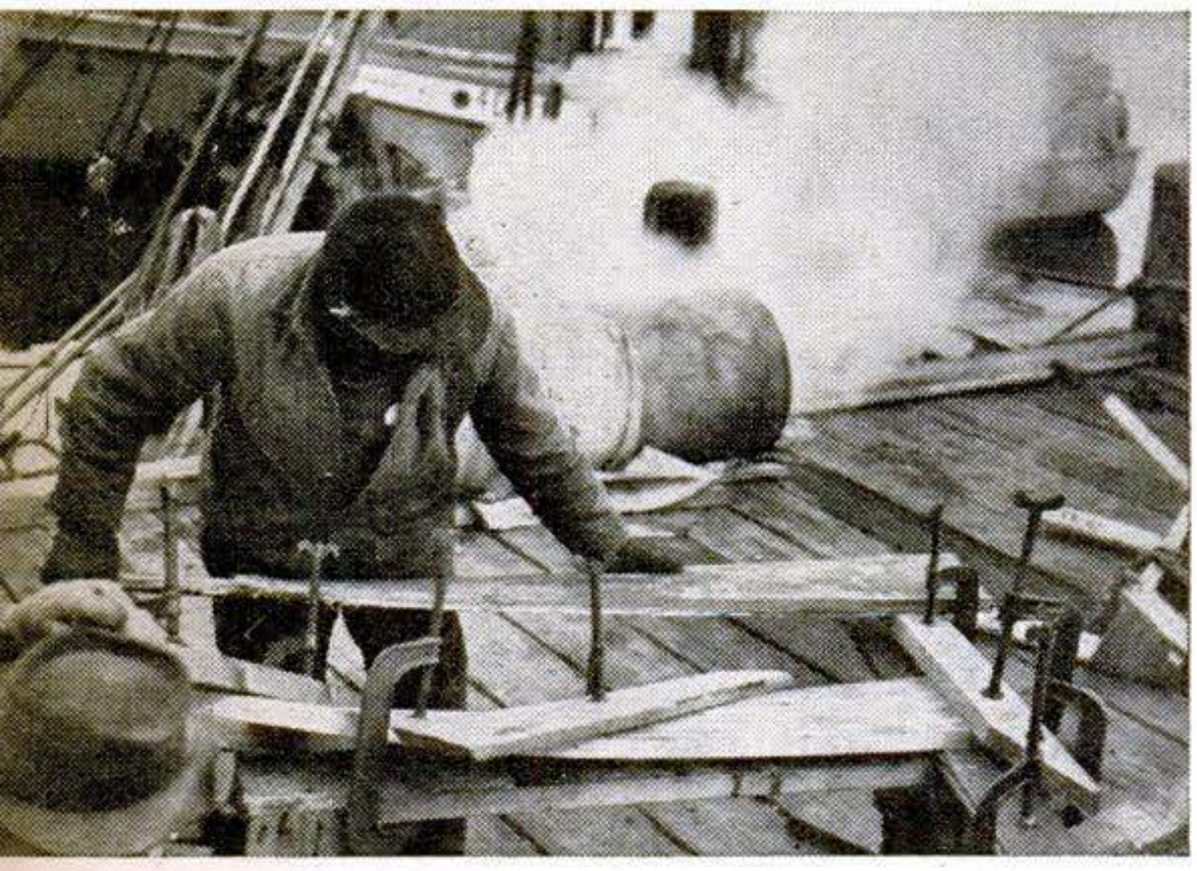
Copyrighted material

the water heated in its lower end, or the galvanized tank may be set level and get its steam from outside. Even professional builders sometimes resort to the drainpipe when they have no regular steam box at hand. If a metal cap is brazed on the plugged end, that end of the drainpipe can be put directly into the fire, possibly into the home furnace. Either it or the tank can be played on with a primus stove or blowtorch.

Attach a heavy cord to the end of the wood pieces as they are put in the drainpipe or tank so they can be pulled out easily after steaming. Add more water when the level gets low. Round drainpipe can be used instead of rectangular for pieces in frames. Short, wide planks can be boiled in a washtub or ash can, or they can be suspended on hooked wires above water level and steamed under sacks or an old blanket.

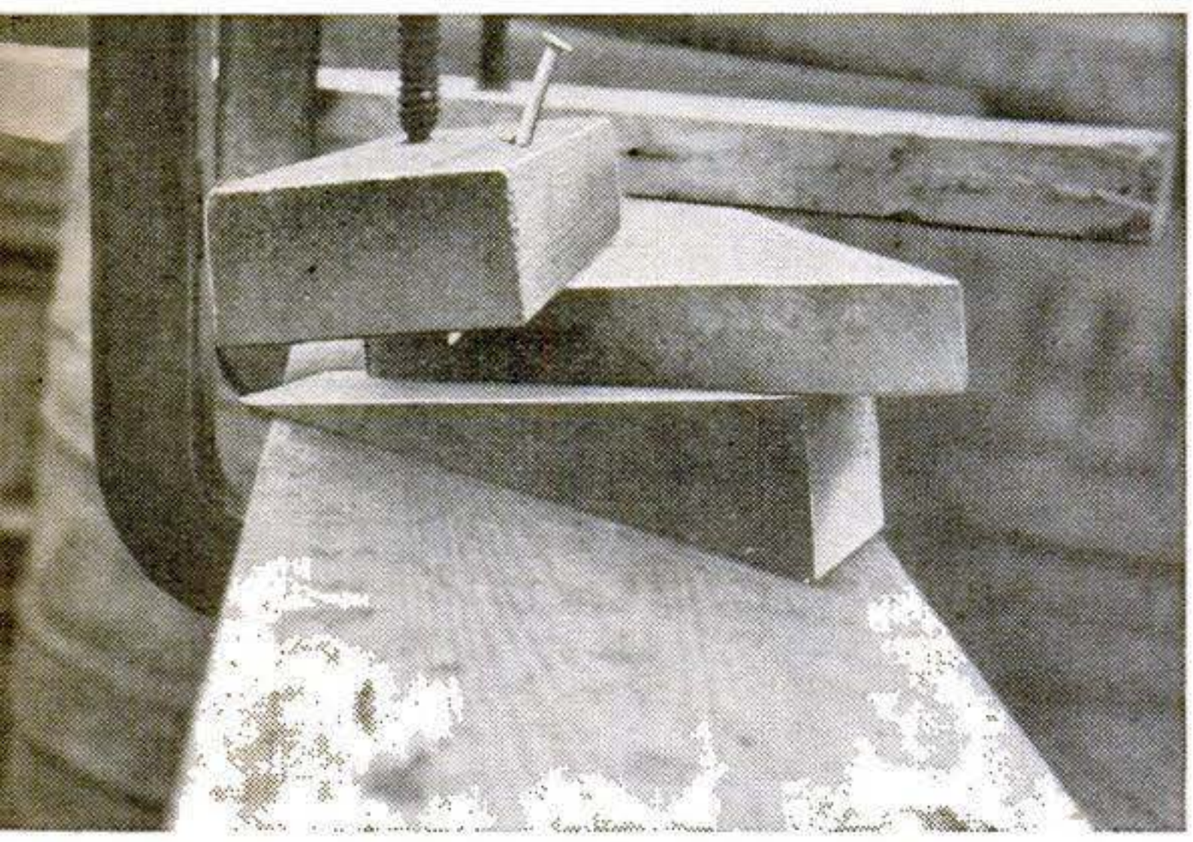
A large teakettle, refilled once or twice during the process, may be sufficient to introduce steam from an outside source. You may find a larger container useful if it has a tight lid and an opening in which the hose can be attached. When an outside source is employed, support the steam box at a higher level so steam will rise to it.

But there is more to steam-bending than the setup. Some amateurs are consistently successful, while others have their share of failures. It depends a good deal on the lumber and how long it is steamed. And for this, no definite time schedule can be offered. The time will vary with the kind of wood, its thickness, the amount of steam generated,

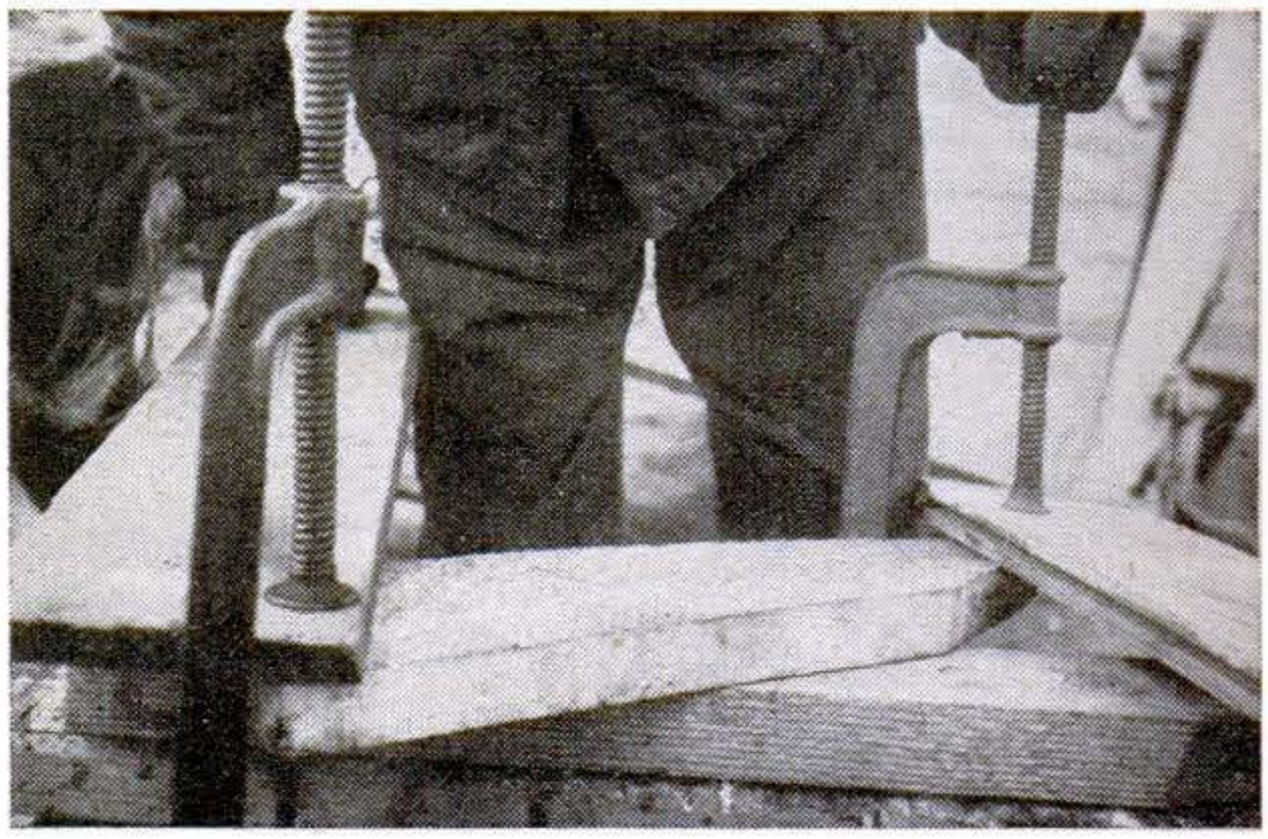


9 More use is found for the old planking as clamping proceeds. Here it's held beside the new piece so the curves of the two can be compared and the proper twist obtained.

10 It is better to give the new piece a little more twist than the old, for it will tend to straighten out some as it cools. A strut is shoved under here to help hold the wood in its permanent shape.



12 Here is another view showing the action of clamps and wedge. Such an arrangement is useful when twist must be added to the curve.



13 This is the second piece of new planking required for the patch. It is steamed separately and put under clamps. Not as much bend is needed.

Copyrighted material

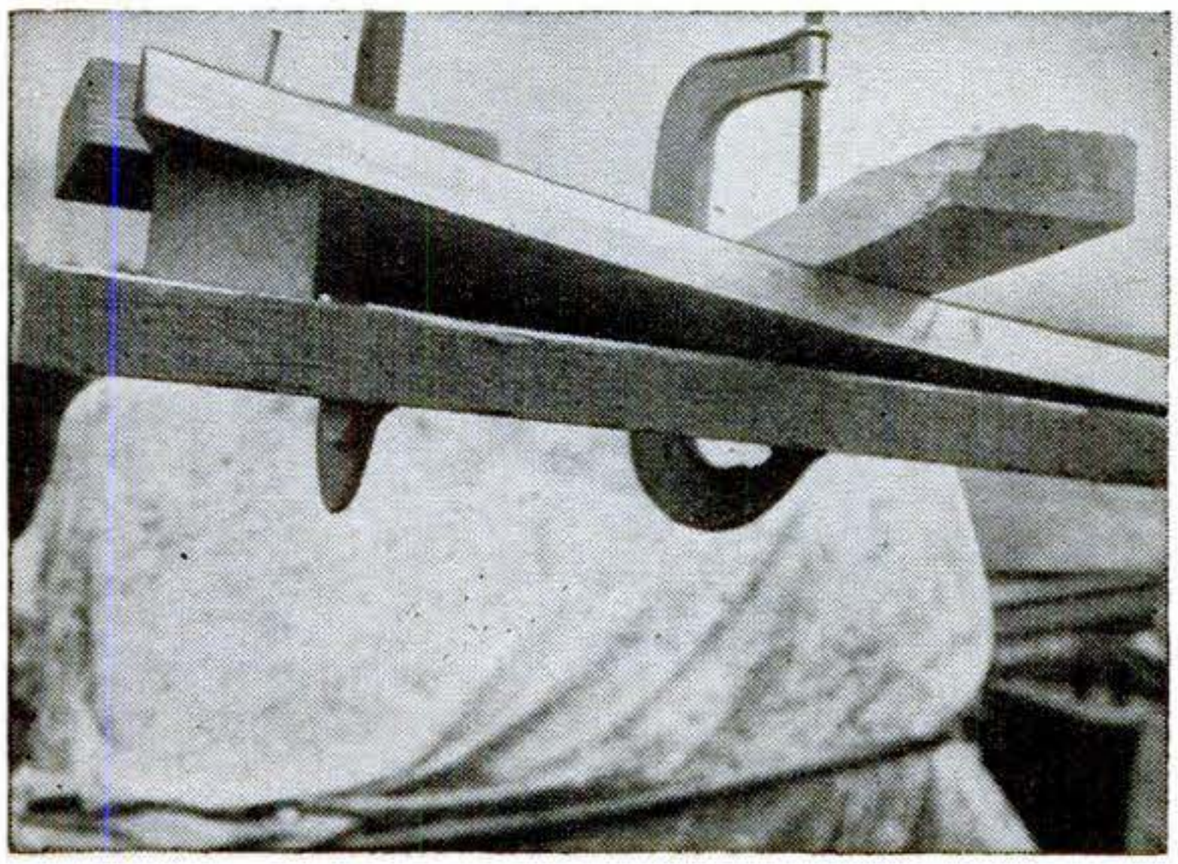
the nature of the steam (wet steam is more efficient than dry), and the bend required.

With experience, you will probably be able to hit the time just about right. If you feel that a piece hasn't been steamed long enough, don't hesitate to put it back into the steam bath. It is possible to steam wood too long, but most failures come from the opposite cause. In general, an hour of steady steaming can do no harm.

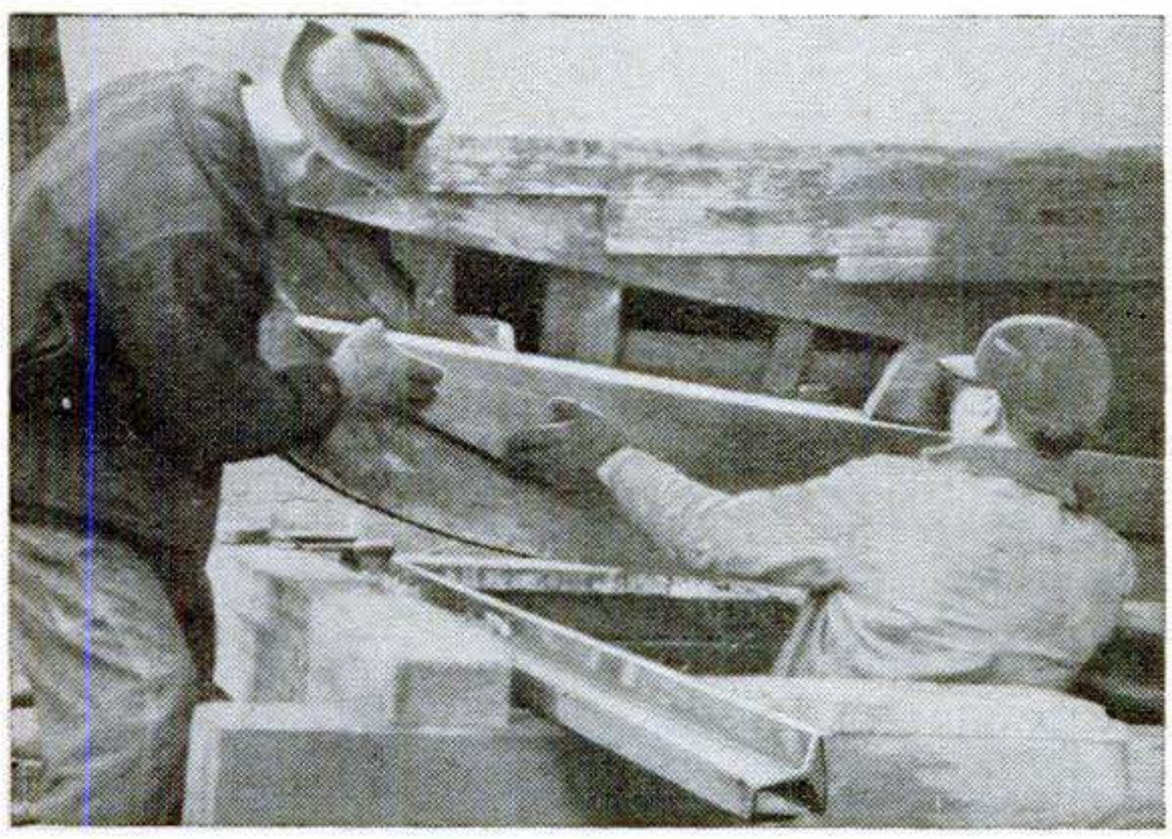
When steaming has been completed, lose no time in getting the piece bent to the curve you want. Give it a little more twist or bend than actually required since it will straighten some when cold and wood that hasn't been bent enough may always be a strain on the hull structure.

The wood should be cut to shape before steaming. Use the old piece being replaced as a pattern if possible. Study the curves both before and during the clamping, and help get them right with blocks and wedges. The latter allow something of an adjustment, since they can be driven in further while the piece is still under clamps. Use plenty of clamps—C-clamps will do—and have extra ones near at hand. Once they have been tightened, don't release them until the wood is again cold and dry.

There's another very necessary addition to your equipment. You'll need the thickest pair of leather gloves you can find—hot wood can be awkward to handle. And call in a friend as a helper. Although it can be done by one man, steam-bending is really a two-man job. END

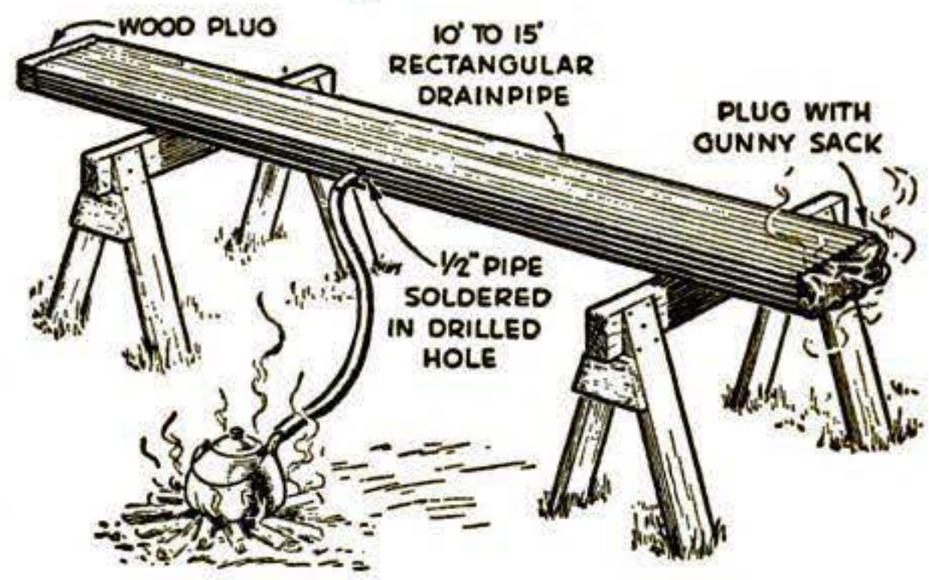


11 Wedges like this will be found an invaluable aid in steam-bending. When more twist must be given the piece, they can be driven in further, often without even loosening the clamps.

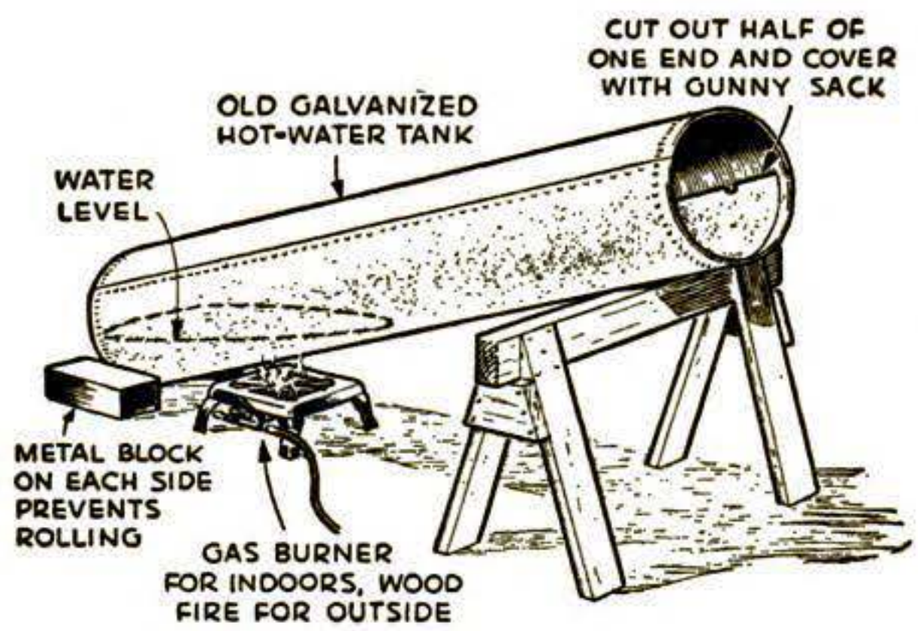


14 Bending completed, the new pieces are fitted in place in the hull section, fastened down, and calked at the seams for tight joints.

HOME RIGS FOR WOOD STEAMING



Rectangular drainpipe is often used by professional boat builders for steaming when regular rigs are not at hand. If a metal cap is used on one end, water can be held in it and that end placed in the fire.

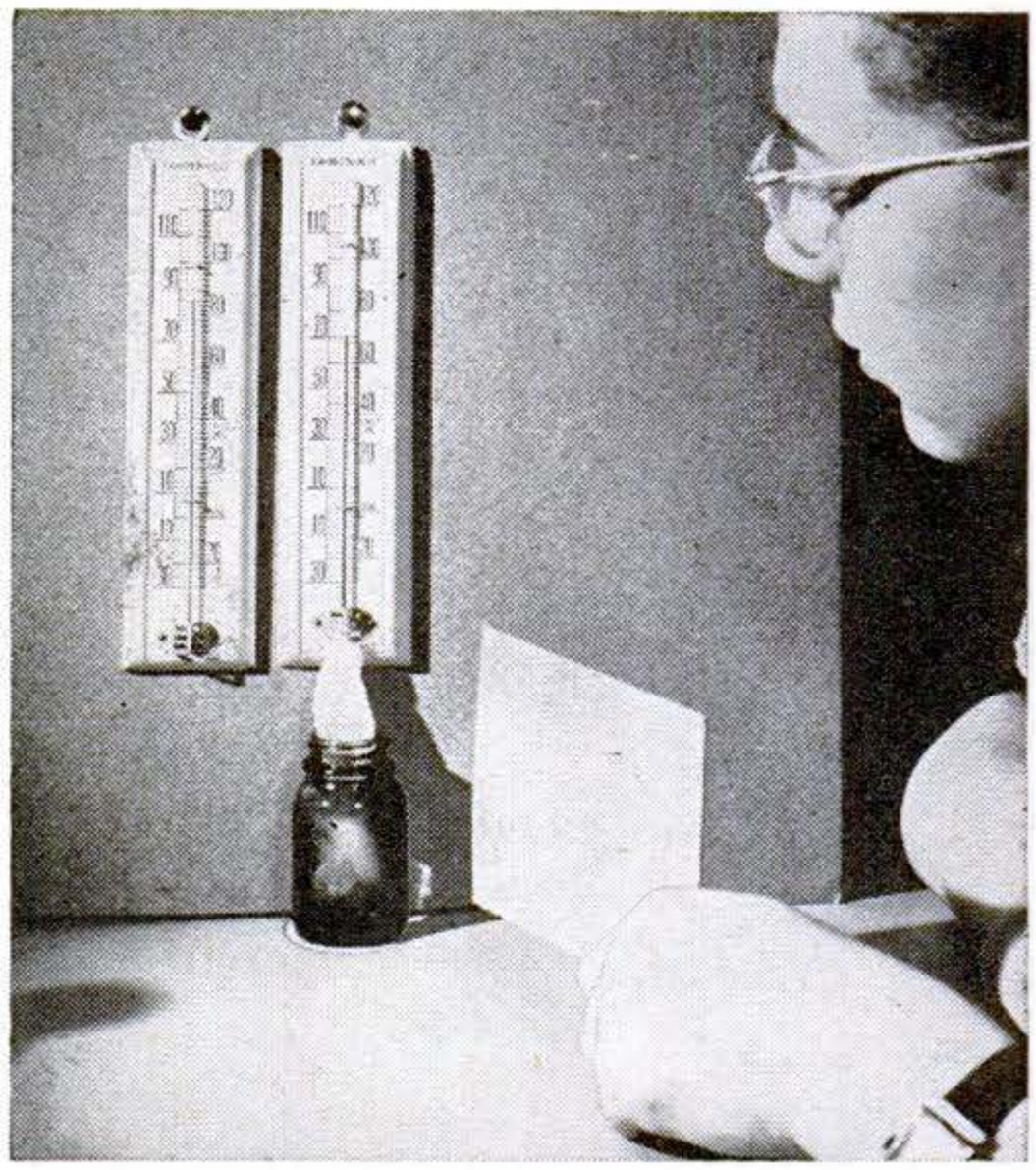


Another convenient steaming rig for wood is an old water tank with one end partly cut out. The boiler can be placed on two props, if preferred, and the steam led in by hose from an external source.

Copyrighted material

Humidity Controls Comfort

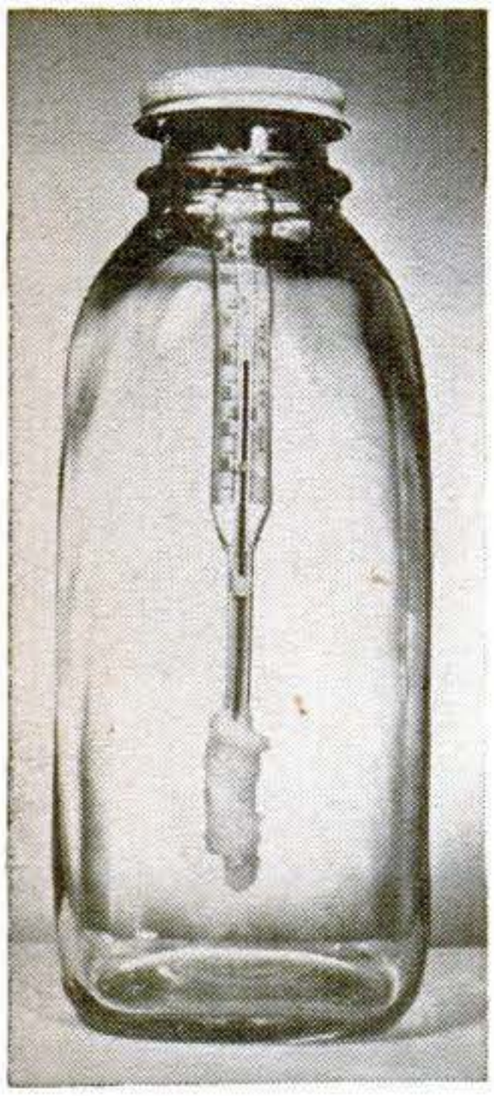
HOW much water vapor there is in the air—or how little—is important to health and comfort. Everyone knows the sticky misery of hot, damp summer days and the equally annoying dryness of nose and throat in overheated rooms in winter. This *relative humidity,* the amount of water vapor contained in the air as compared with the amount that it can hold, is most agreeable at about 45 percent of saturation. The accompanying experiments will tell you more of its measurement and its effects.

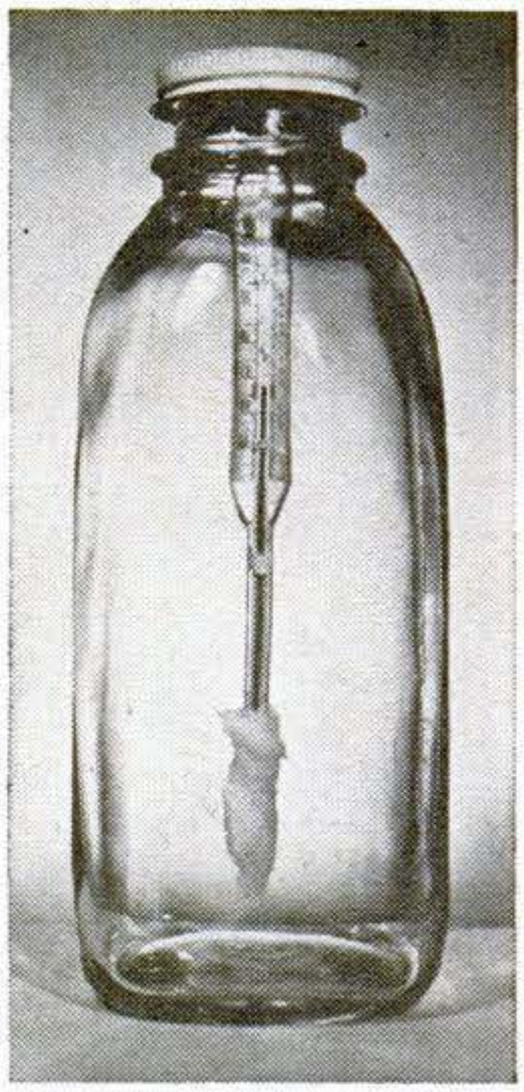


DETERMINING RELATIVE HUMIDITY. The rate of evaporation of water, and hence its cooling effect, will depend upon how saturated with moisture the surrounding air is. Thus relative humidity can be measured by comparing the readings of dry- and wet-bulb thermometers. Mount two ordinary thermometers next to each other. Leave the bulb of one dry, but wrap that of the other tightly with absorbent cloth having a loose end dipping into a small bottle of water. When the cloth has become thoroughly wet, fan the air about the thermometers rapidly for a few minutes and note the two readings. The relative humidity can be found by referring to the table below.

Dry-bulb temp. (deg. F.)	Difference between dry and wet bulbs (deg. F.)					
	3	6	9	12	15	18
65	85	70	56	44	31	20
70	86	72	60	48	36	26
75	87	74	62	51	40	31
80	87	75	64	54	44	35
	Relative humidity (percent)					

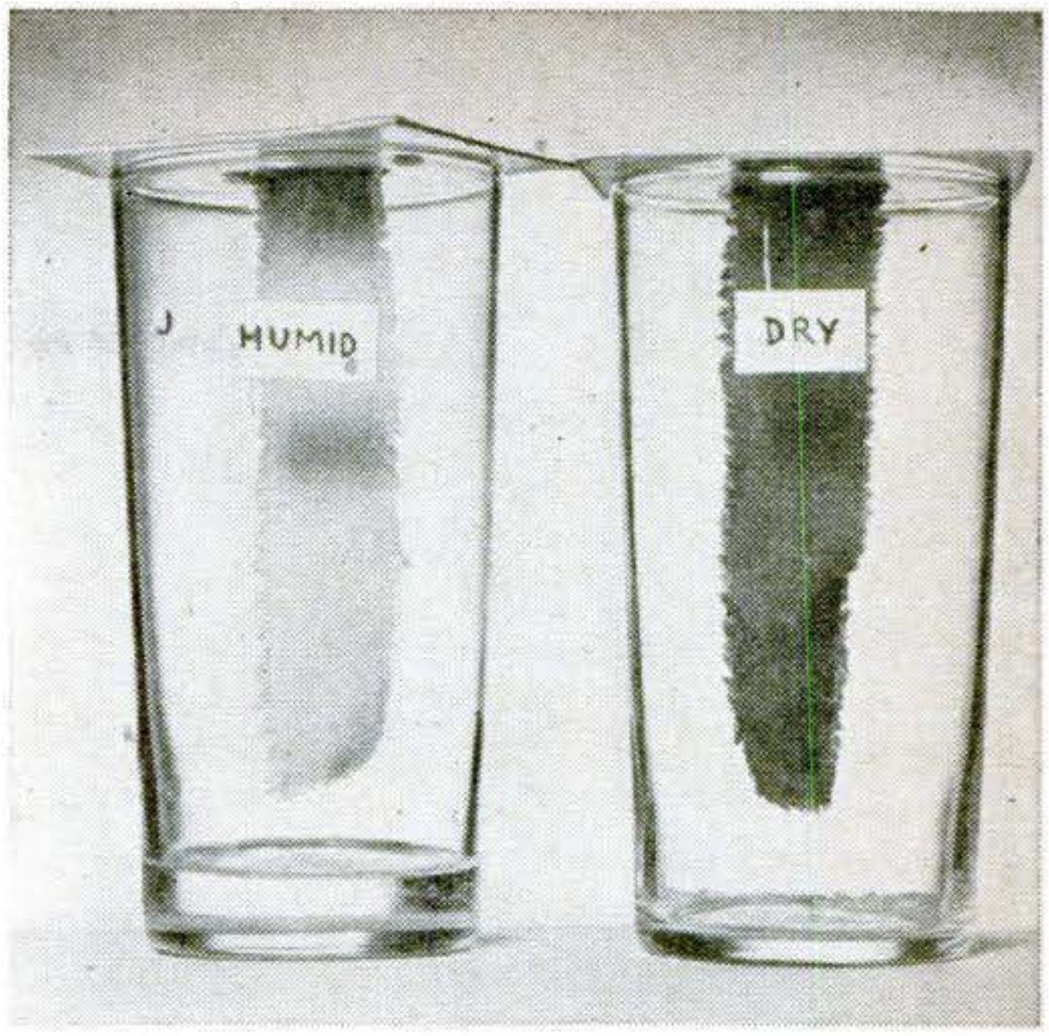
HOME EXPERIMENTS





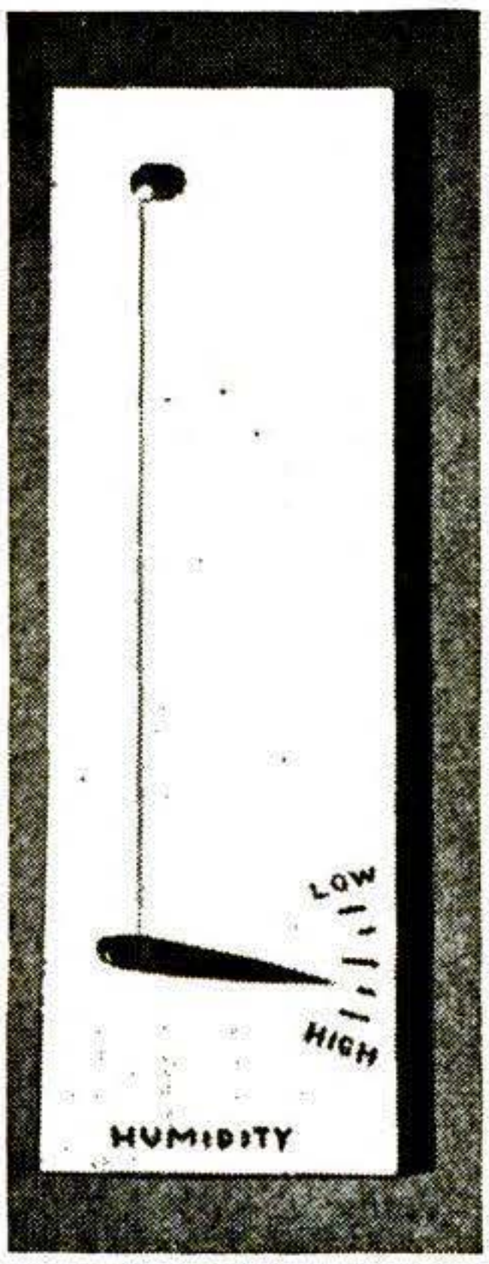
WHAT EVAPORATION DOES. You feel cool on a hot day if the air is dry and perspiration can evaporate. Here's why. Wrap the bulb of a thermometer with wet cotton, suspend the thermometer in a jar, and cover the top. Slowly, as water evaporates, the mercury will drop, stopping when the air in the bottle becomes saturated. Then, when no more water can evaporate, the temperature will rise again to that of the room.

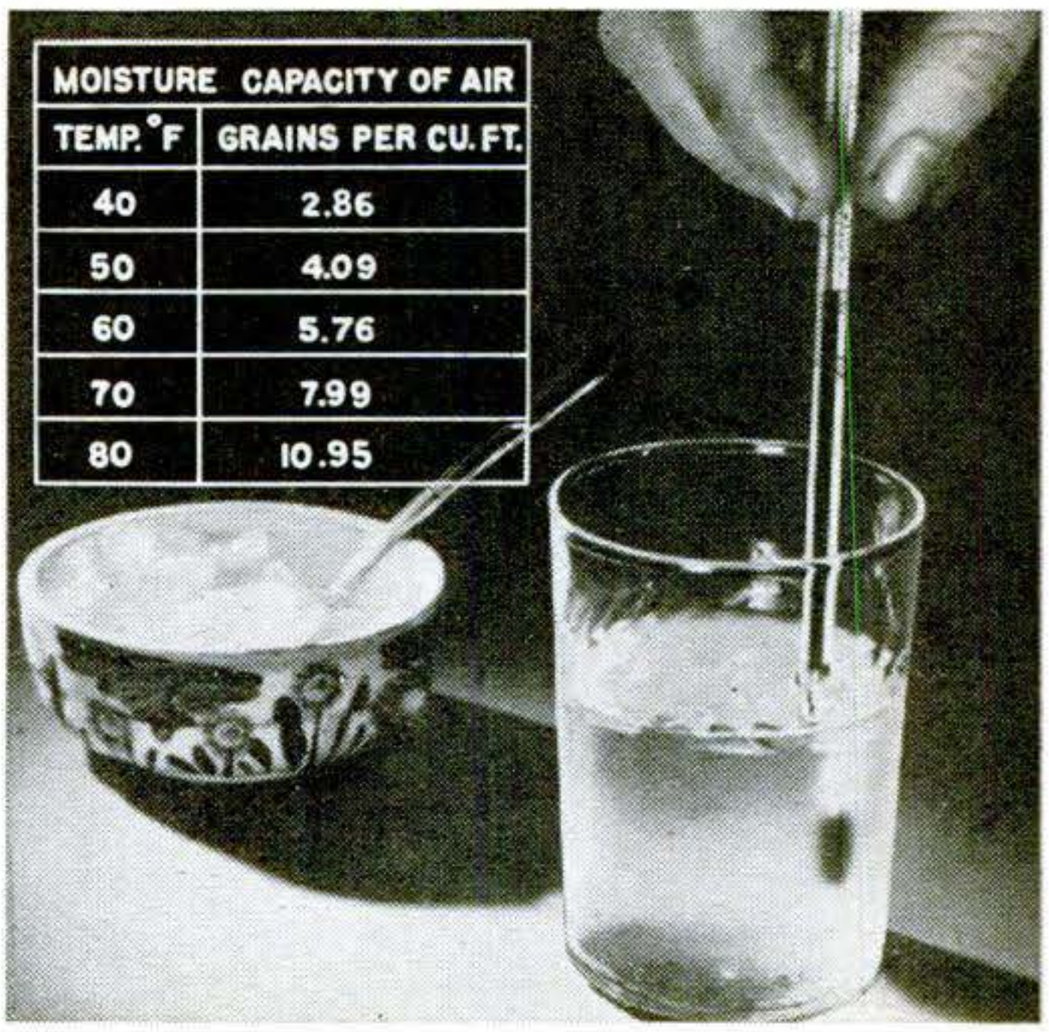
Copyrighted material



COLOR HUMIDITY INDICATOR. Remember the old-fashioned cloth flowers and doll dresses that changed from pink to blue and back again? Humidity did it. They had been soaked in cobalt chloride, the crystals of which lose water and turn blue in dry air and absorb water and turn pink in moist air. To demonstrate, prepare cloth strips by soaking in a moderately strong solution and let them dry. Hang one in a tumbler containing a little water and the other in one that has been warmed dry. The former will become bright pink and the other deep blue. Switch them, and their colors reverse.

DAMPNESS AFFECTS HAIR. Relative humidity can be measured by a hair used as the operating element of a simple hygrometer, because hair stretches in humid weather and shrinks when the air is dry. Select a hair at least 6″ long and wash it carefully in alcohol or ether to remove all grease. Then with a spot of sealing wax attach one end near the top of a sheet of cardboard and the other to a pointer near the lower end. The pointer, which may be cut from tin-can stock or other light metal, is pivoted on a small nail to magnify the change in length of the hair. For fairly accurate readings, the improvised instrument can be calibrated by comparison with the wet- and dry-bulb thermometer table given on the facing page.

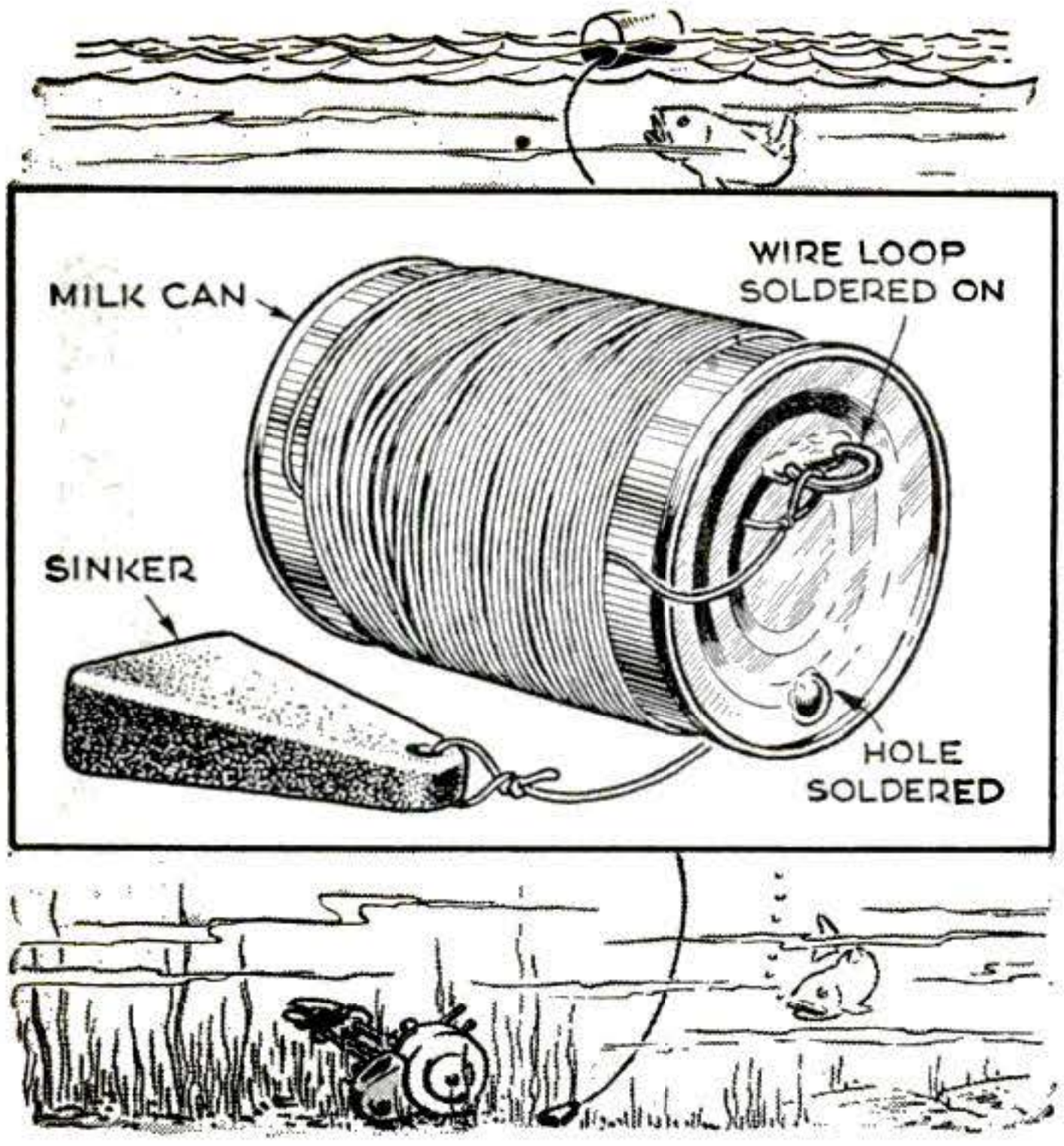




MOISTURE CAPACITY OF AIR	
TEMP. °F	GRAINS PER CU. FT.
40	2.86
50	4.09
60	5.76
70	7.99
80	10.95

WHAT THE DEW POINT SHOWS. Condensation helps in calculating relative humidity. Half fill a tumbler with water and stir with a thermometer while adding ice. Note the temperature at which the glass begins to "sweat"; then add no more ice and take a reading when the moisture disappears. The average of the two is the dew point. Moisture capacity (from the table above) at room temperature divided by that at the dew point gives relative humidity.

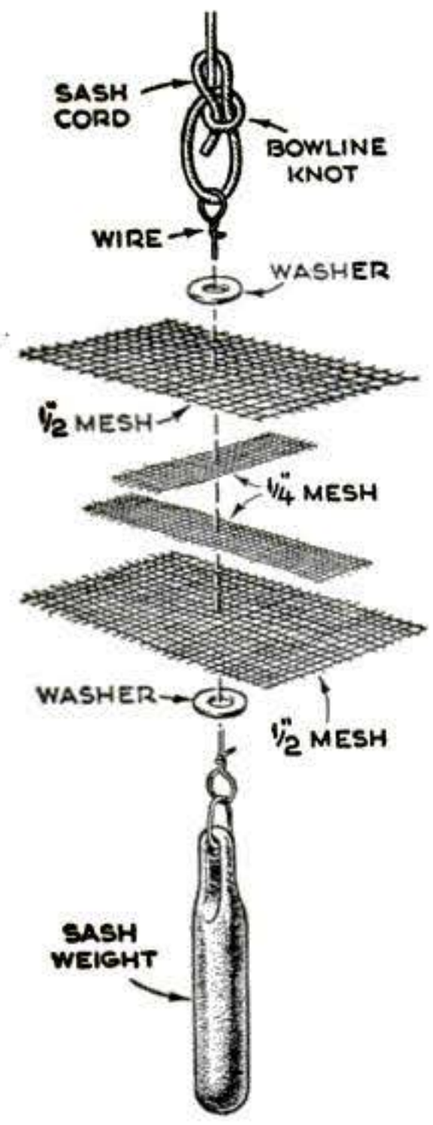
Copyrighted material



Buoy Tags Gear Lost Overboard

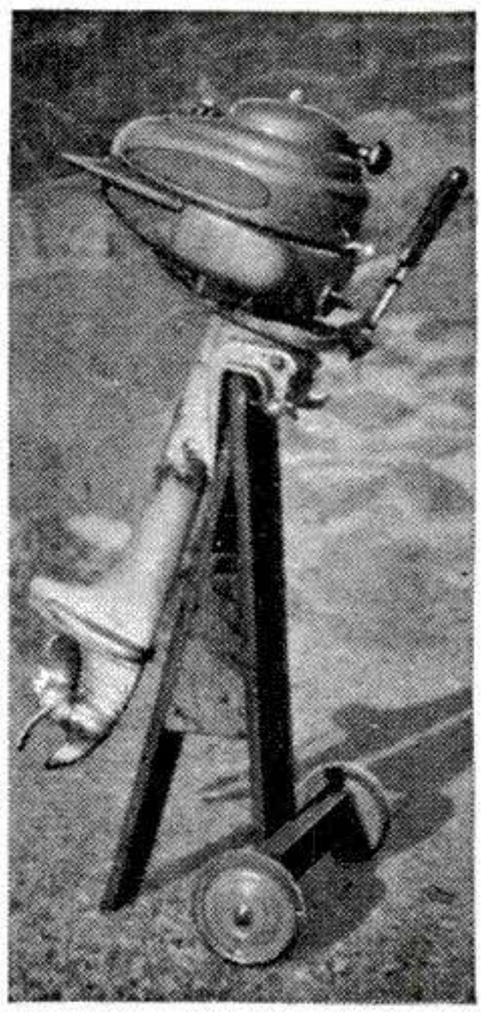
FISHING and boating gear is occasionally lost overboard, and when you're out too far to take bearings from the shore, it is almost impossible to relocate the spot. This marker, made of an empty milk can, a sinker, and a length of line great enough to reach bottom at any likely depth, provides a quick, sure way to locate the place where the loss occurred. With the hole or holes soldered closed, the can will float at the end of the anchored string until you can return to grapple for the lost article.—W. BALLINGALL.

Wire Screen Sweeps Chimney

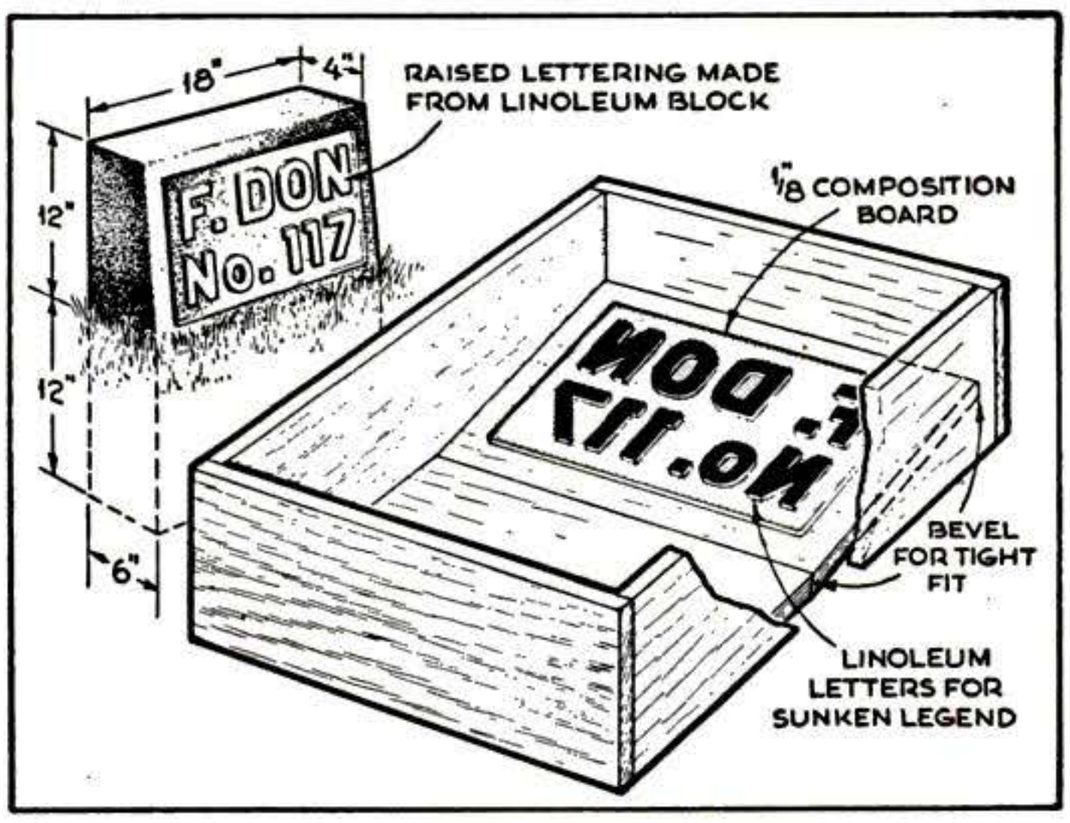


WHEN chimney-cleaning time rolls around, a sweep like the one shown here will scrape away soot in a hurry. Being flexible, it will adjust to minor obstructions and offsets. Two pieces of coarse screen are laid together with two strips of finer mesh crossed at right angles between them. Thread a piece of wire through to hold the sandwich tight, tie a length of sash cord to the top, and add a weight to the bottom to pull the sweep down.—J. F. ALSTAD.

Scooter Rolls Outboard Motor



SCRAP boards, a couple of 5" wheels, and some screws and washers were used in the construction of the motor carrier shown in the picture at the right. Two flat pieces screwed together at the top and braced about midway by a small triangular piece form a sturdy stand. Fasten an axle and toy-wagon wheels to the foot of one of the boards. It will stand by itself when left upright. The motor is clamped to the top of the carrier, and the rig is steered and pushed by means of the motor handle.—C. DE WITT ROGERS, JR.

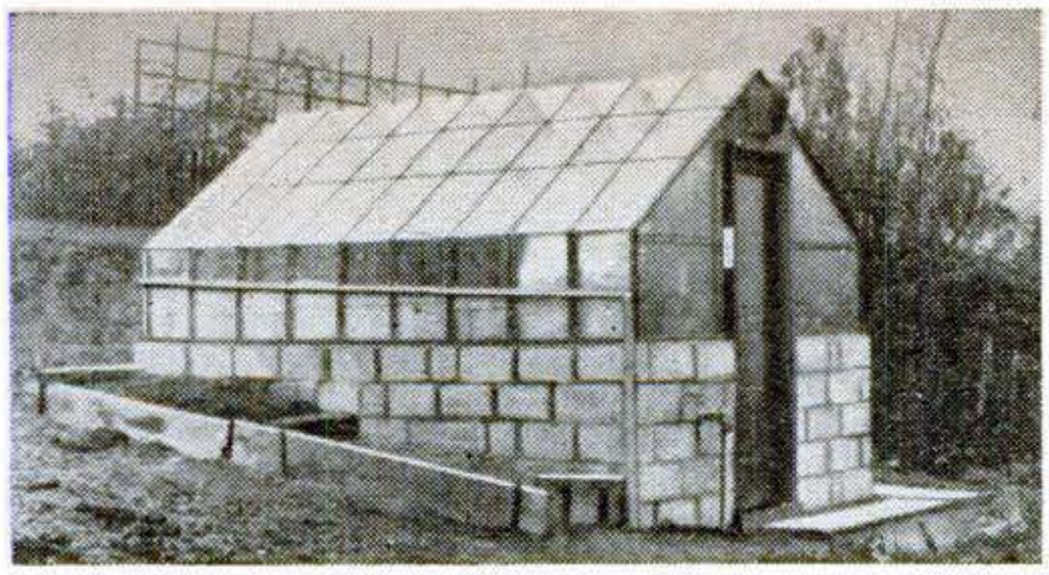


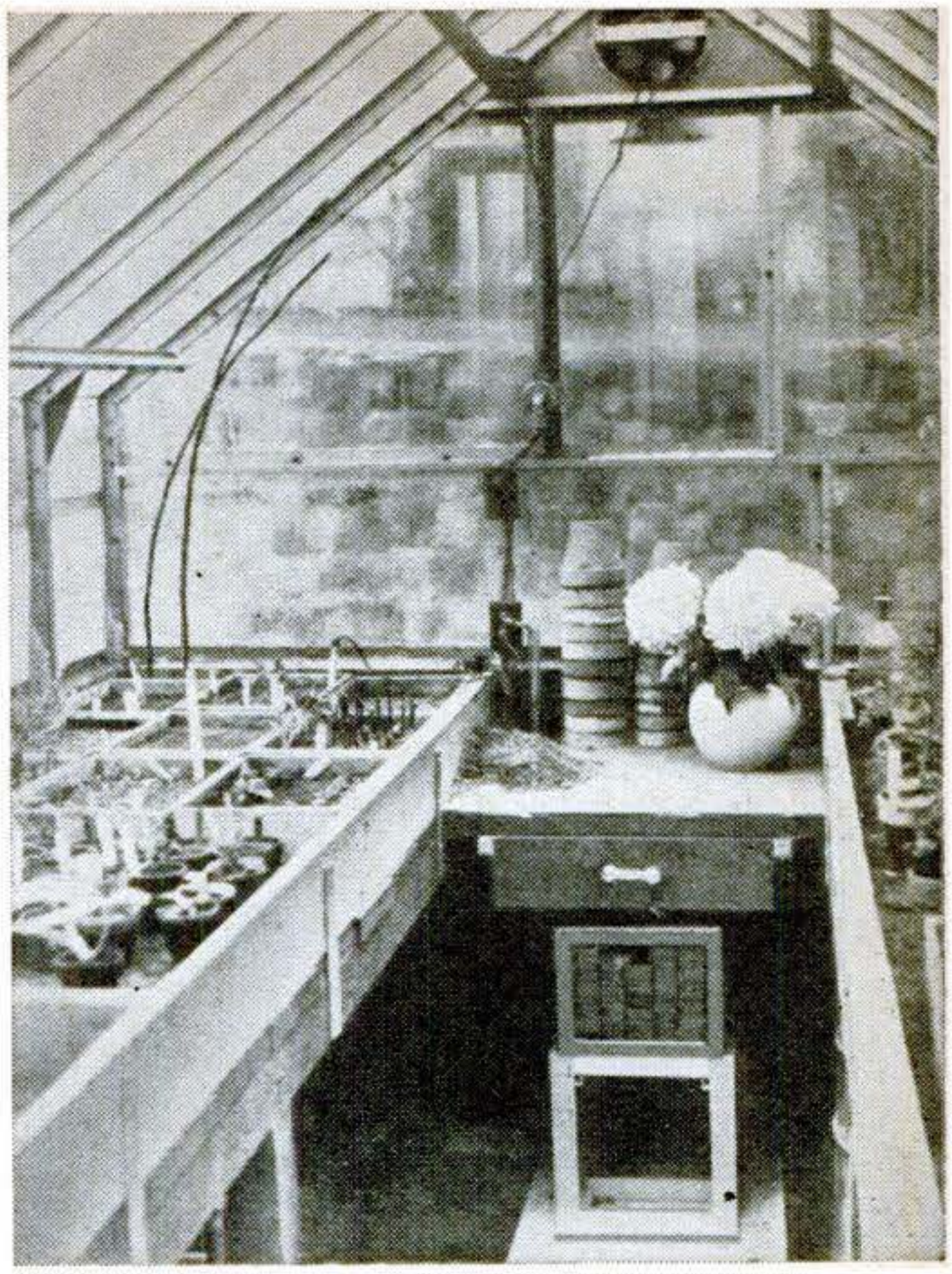
Lawn Block Is Cast in Concrete

STONECUTTING is a job few householders want to tackle, yet many would like permanent lawn markers bearing their name or house number. The marker shown is cast concrete. Inscriptions may be either raised or sunken. A linoleum cutout is used for molding the former, and linoleum letters are nailed to a composition-board backing for producing the latter. A decorative design may be added.

Make a wooden box for the form. Set in half the bottom at an angle, beveling the edges for close, leakproof joints. Line the section above ground with cardboard to keep grain from "printing."—C. L. MEEHAN.

Copyrighted material





Greenhouse Framework Is Built of Surplus B-29 Wing Spars

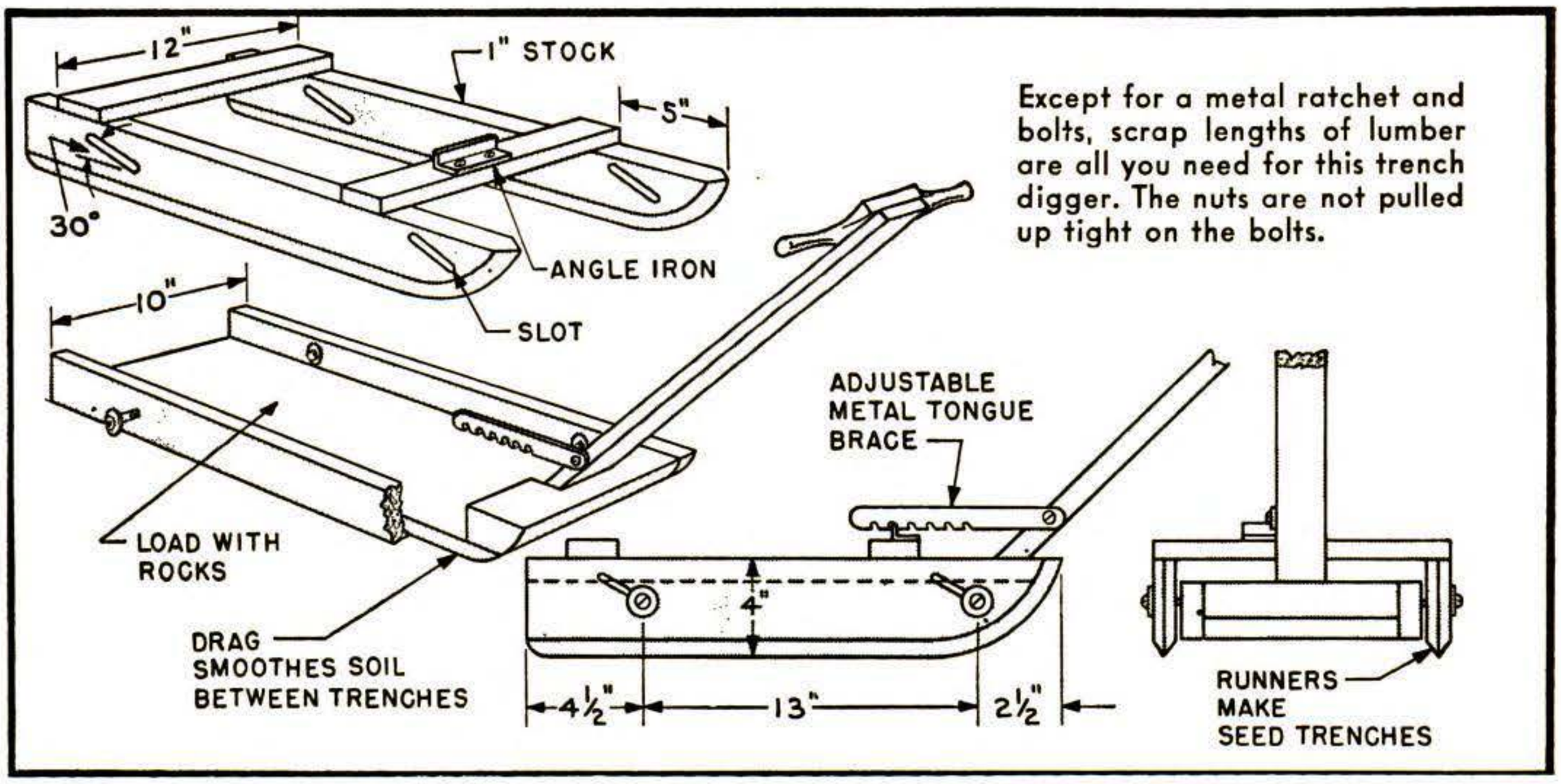
ALUMINUM wing spars, war surplus from Superfortresses, serve as the framework for this greenhouse built on a cement-block foundation. The glass is fixed to the aluminum frame with spaced clips embedded in gun-calking compound, also a war surplus.

A 1½-kw. heater (under the bench), electric cables heating the propagation beds, and two ventilating fans are controlled by thermostats.—FRANK P. CLEMENTS.

Beveled Runners on Drag Cut Parallel Trenches for Seeding

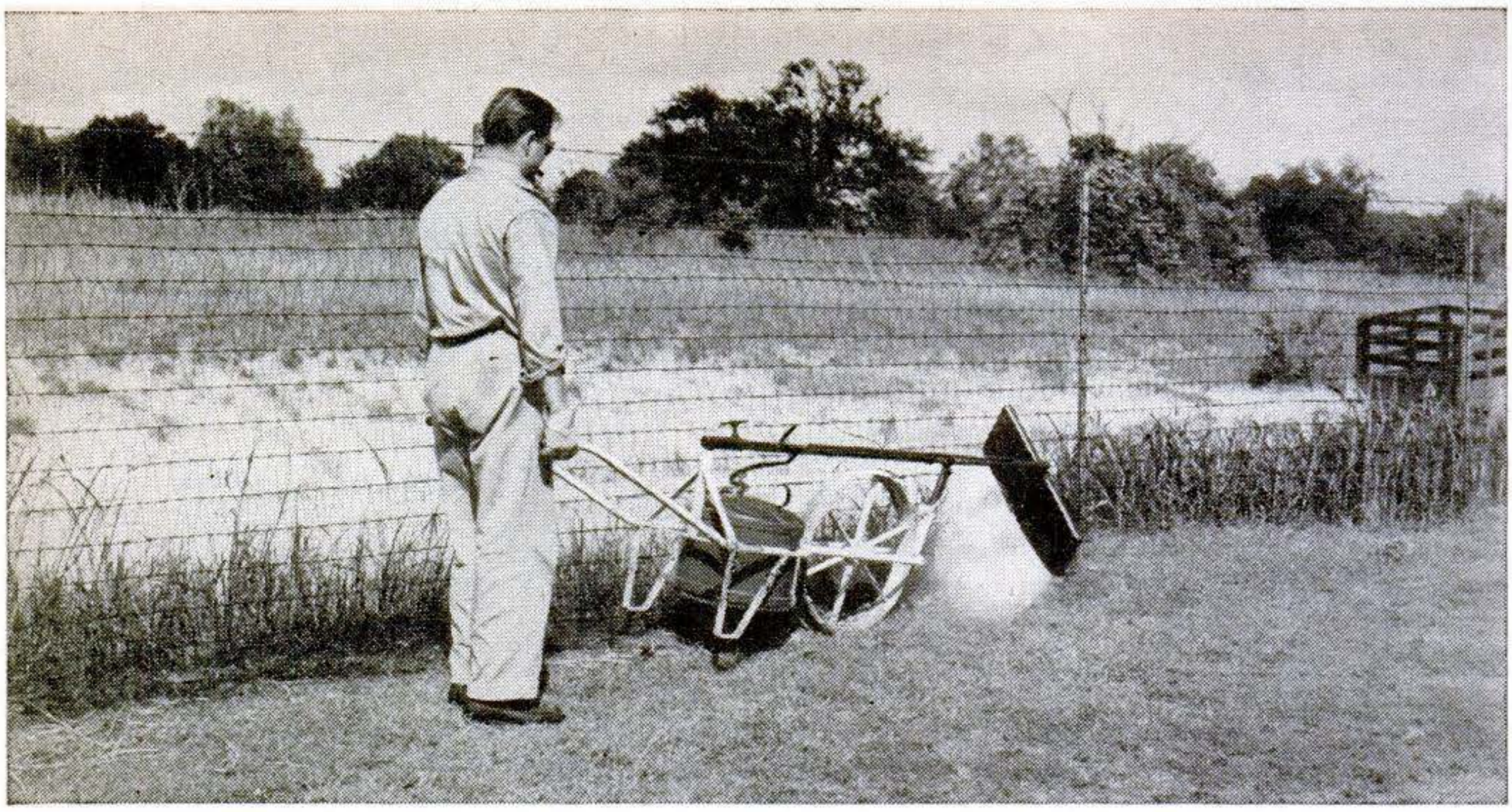
MAKING parallel trenches of uniform depth for seed, difficult at best with a hoe or pointed stick, is a quick job with this trenching drag. Constructed with runners like a sled, it is adjustable to different depths and, weighted with rocks, smooths the soil between the rows.

Bevel the runners to a sharp edge on the bottom—they cut the trenches—and mount them on the inner drag with four bolts put through the 30-deg. slots. Moving the runners all the way forward makes the deepest trenches, all the way back the shallowest. A ratchet on the handle bar will hold them in the desired position. If rows spaced wider than 12″ are required, simply move the drag over, lapping one set of trenches, and use only the outer ones for seeding.



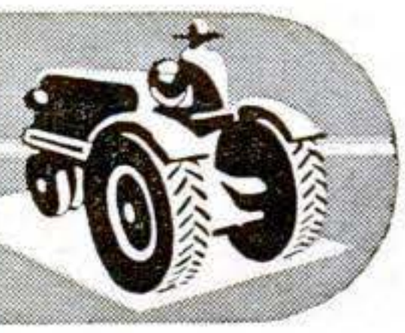
Except for a metal ratchet and bolts, scrap lengths of lumber are all you need for this trench digger. The nuts are not pulled up tight on the bolts.

Copyrighted material

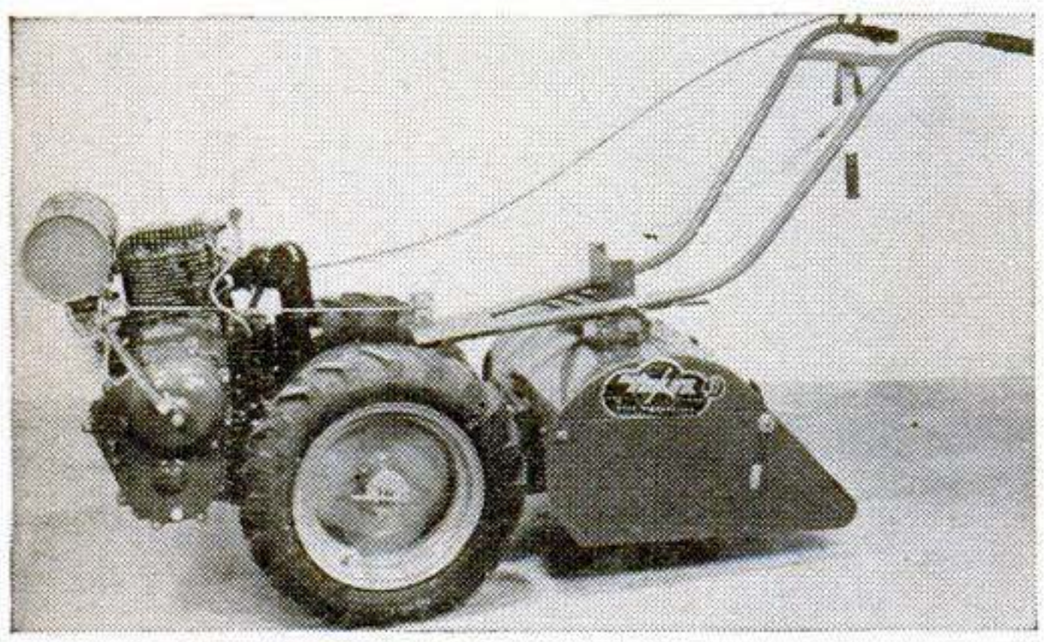


GASOLINE BURNER KILLS WEEDS. This ground clearer has an adjustable burner head to sear out grass and weeds along a fence and in other spots inaccessible to a sickle or mower. The flame nozzles, mounted on a steel-tubing boom, can be raised, lowered, or twisted to a 45-deg. angle. A three-hour supply of gasoline or kerosene is held in the tank. The Killall burner is made by General Corporation, of Dallas, Texas.

FOR EASIER FARMING



ROTARY-PLOW CULTIVATOR. Plowing, disking, and harrowing are done in one operation by the 1947 model Tillex "31," made by the Bray Corporation, of Pasadena, Calif. The frame and motor and plow housings are of all-aluminum construction, reducing total weight to 325 lb. This lightness makes the cultivator suitable for gardens, but the machine is strong and durable enough for use on large farms as well.



TUMBLER TREATS SEEDS. A discarded can forms the tumbling chamber of a homemade seed treater built by Meade Pottenger, of Hamilton County, Ohio. Mounted on an axle with an auto wheel and tire for easy hand operation, the device mixes seeds and hormone, antirot, or other treating dusts thoroughly even in big quantities.

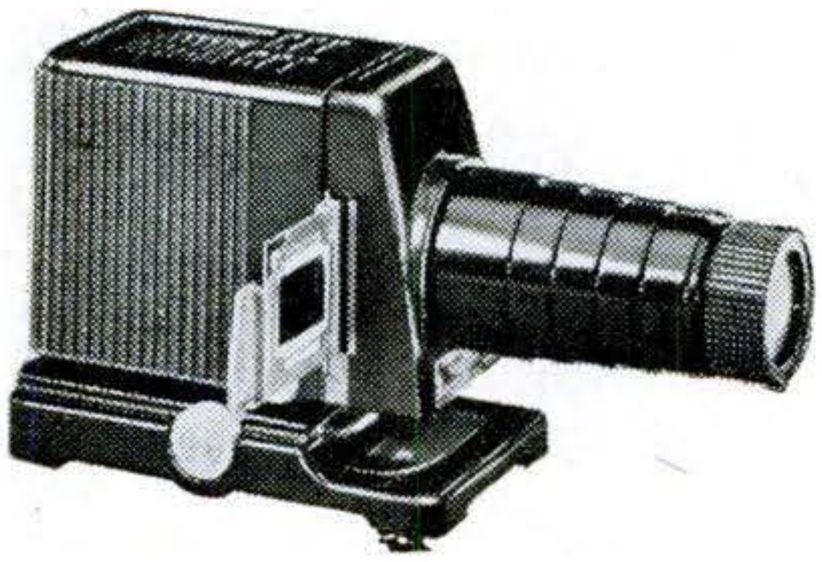
Copyrighted material

FOR SUPERB COLOR SHOWS...

Kodak Still Projection Equipment

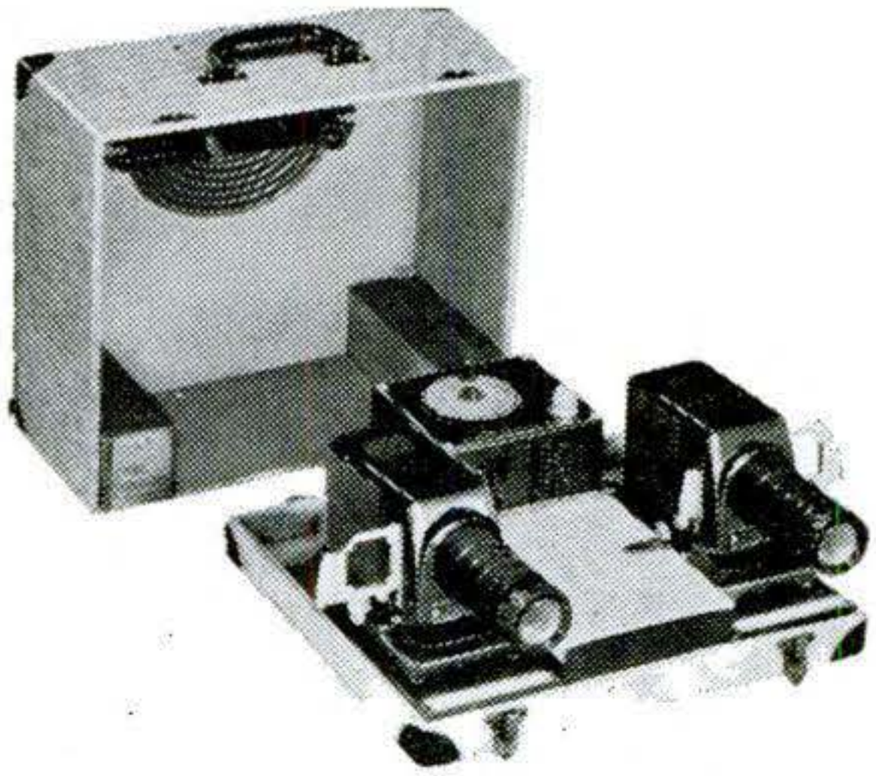
Set up your trim, efficient Kodaslide Projector; load as many as 46 slides in the Kodaslide Changer . . . and you're off to a brilliant showing.

For the slick professional touch, use two Kodaslide Projectors, with the Kodak Dissolve Control Outfit . . . one slide fades out as the next fades in. Consult your Kodak dealer about this equipment . . . EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.



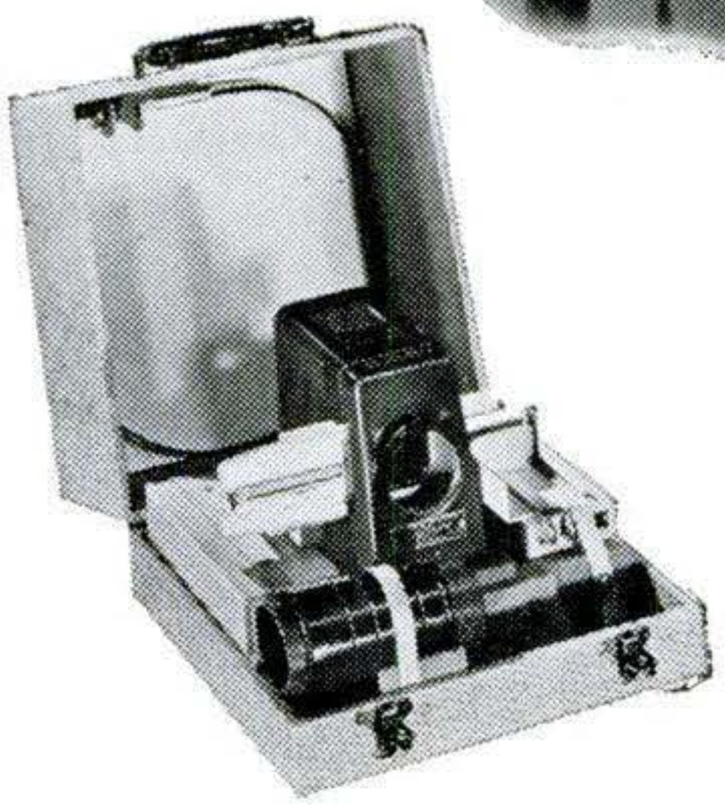
Kodaslide Projector, Model 2A, with 5-inch f/3.5 lens

Shows your Kodachrome transparencies brilliantly. Lenses and entire optical system *Lumenized*—ultrahard coated. Result: approximately 50% more illumination delivered to your screen . . . Accessory 7½-inch *f*/4 lens also available.



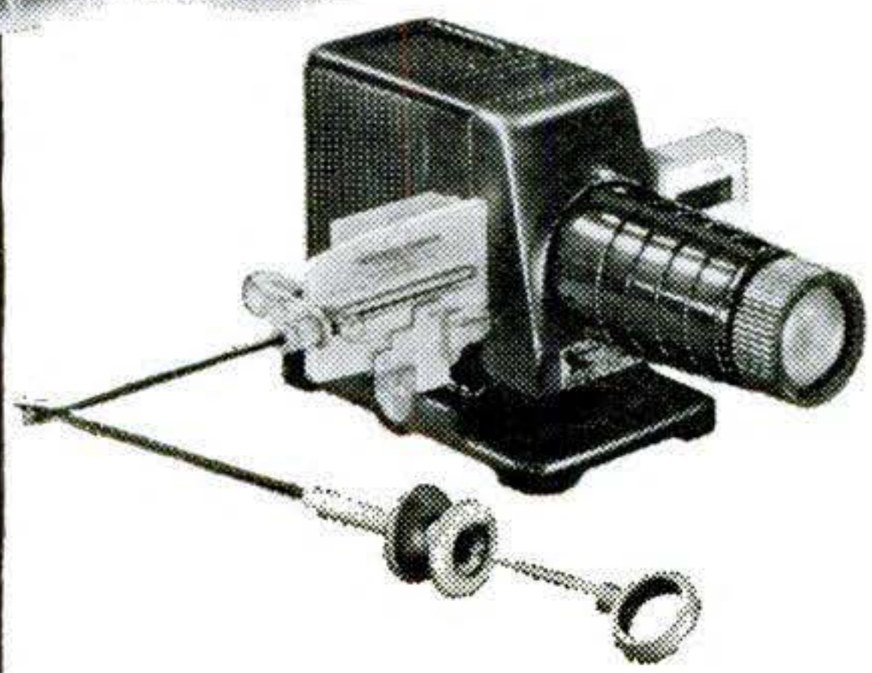
Kodaslide Dissolve Control Outfit

One image appears on screen as other fades out. No awkward pauses, no "break." Outfit consists of case, electrical control unit, two projector platforms, storage space for lens barrels and slide files. (Projectors not supplied with unit.)



Combination Case

Provides space for Kodaslide Projector, Model 2A, spare lamps, the lens, a Kodaslide Changer, and two Kodaslide Sequence Files. Removable cover contains matte screen for trial projections.



Kodaslide Changer (shown here on Model 2A Projector)

Hand-operated plunger (30" cable) automatically changes up to 46 Kodaslides. Fits Kodaslide Projectors, Models 1, 2, 2A.

Kodak

Copyrighted material

the right files for the Home Workshop

MODEL MAKING . . . woodworking . . . metal work . . . whatever your hobby, it's bound to give you more satisfaction when the tools you use are tops in quality and *right for the job*. In files, that means Nicholson or Black Diamond.

Use small size, single cut standard files and X.F. Swiss Pattern Files on delicate metal parts. Rasps and double cuts for woodworking. Milled Tooth and Super Shear Files for soft metals and plastics. Mill Files for sharpening and smooth finishing.

Shapes and sizes for most any job are obtainable through the better hardware stores and industrial supply houses.

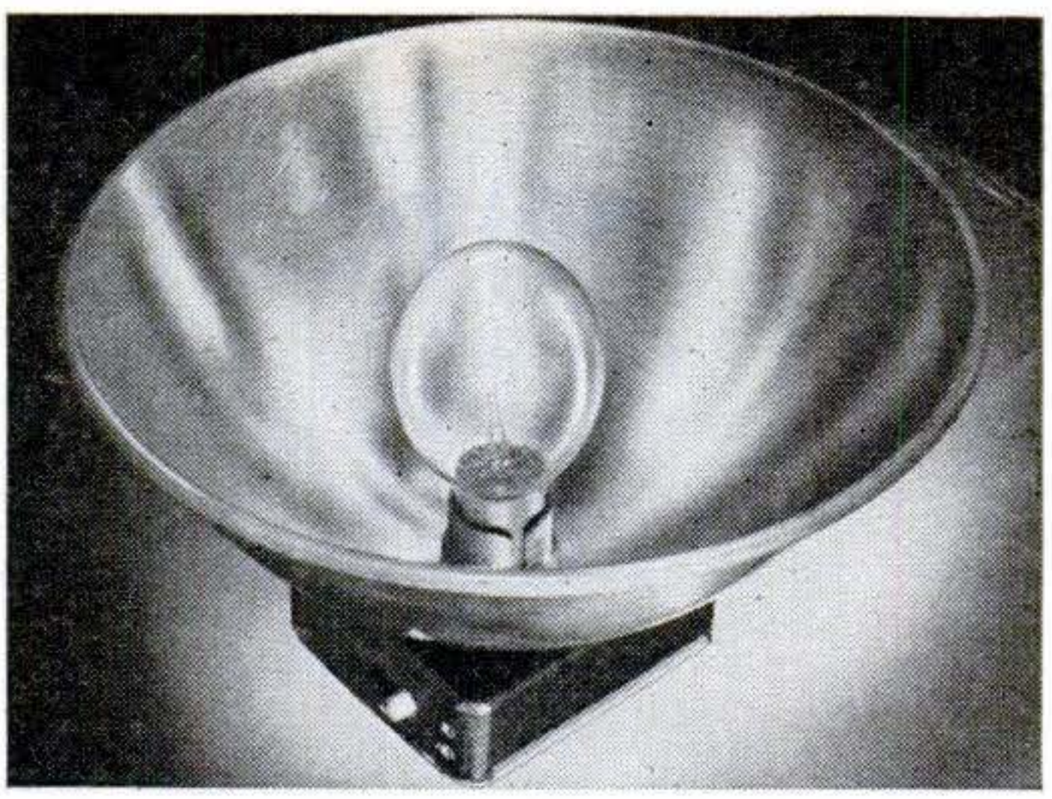
FREE BOOK — "FILE FILOSOPHY"

NICHOLSON U.S.A.

NICHOLSON FILE CO.
19 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)

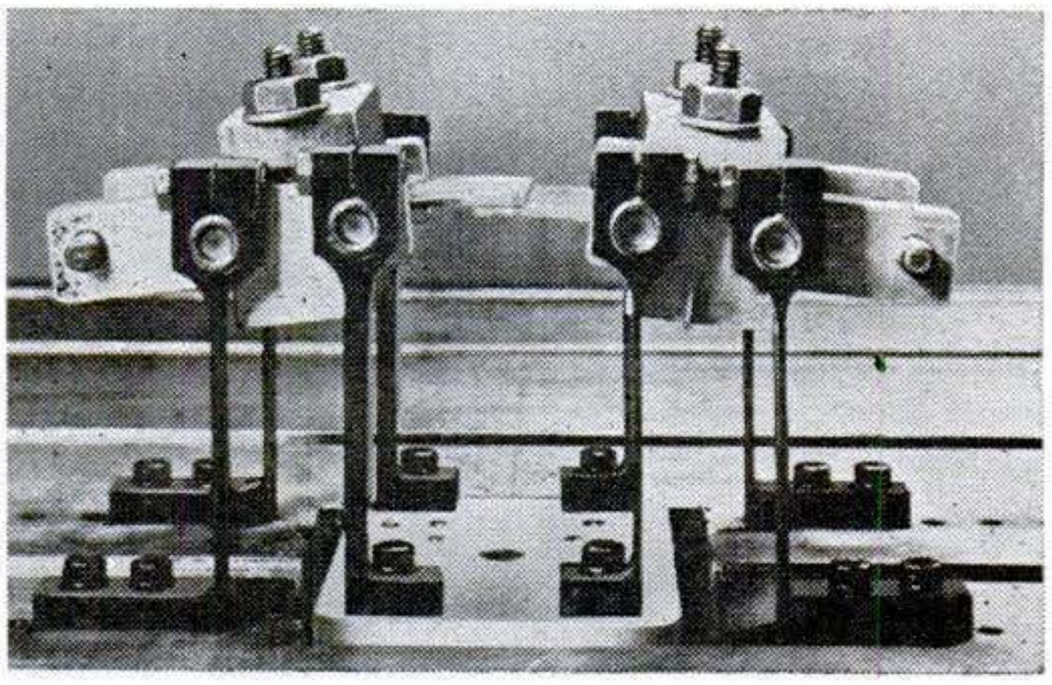
BLACK DIAMOND TRADE MARK

NICHOLSON FILES ***FOR EVERY PURPOSE***

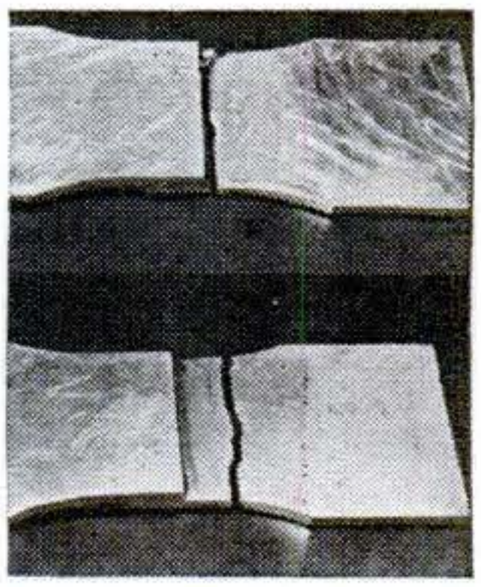


Hand Flash Unit Fits Palm

COMPACT and convenient, the Hand Flash Synchronizer, manufactured by the Peak Photo Products Company, features a battery case that fits into the palm of the hand and a centrally located push-button release for ease of operation.



Strong Plastic Glues Metal



A NEW plastic adhesive, used in cementing pieces of metal together, was found in recent fatigue tests to be stronger than the metal on which it was tried. In the machine shown above, alternating bending stresses, repeated millions of times, were applied to specimens of 1/16-inch duraluminum cemented together with the plastic. In all but one of 15 tests, conducted by the Sonntag Scientific Corp., the adhesive held while the metal fractured. Small photo shows a specimen of the duraluminum before (top) and after (bottom) undergoing the test.

Copyrighted material

Radiator rusted—Vacation busted

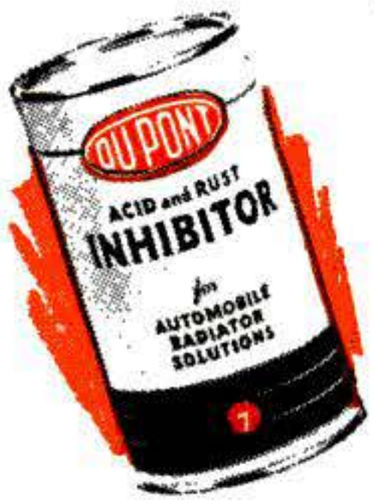
Clean out rust with

DU PONT Cooling System CLEANSER

Before your engine is ruined by overheating, clean out rust and scum in the radiator. Just pour in a can of DU PONT COOLING SYSTEM CLEANSER, run the engine 30 minutes or more, then drain. No reverse flushing is necessary. It dissolves rust—cleans thoroughly, quickly, and safely.

Then keep out rust with

DU PONT Acid and Rust INHIBITOR



After cleaning out the radiator, you can keep it free from rust all season by pouring in a can of DU PONT ACID AND RUST INHIBITOR. This neutralizes the acid and prevents damaging rust from forming.

Avoid radiator leaks with

DU PONT Cooling System SEALER

You can stop leaks quickly and securely—and make the cooling system LEAK-PROOF—by pouring in DU PONT COOLING SYSTEM SEALER. It will not clog the radiator or harm hose or metal parts.

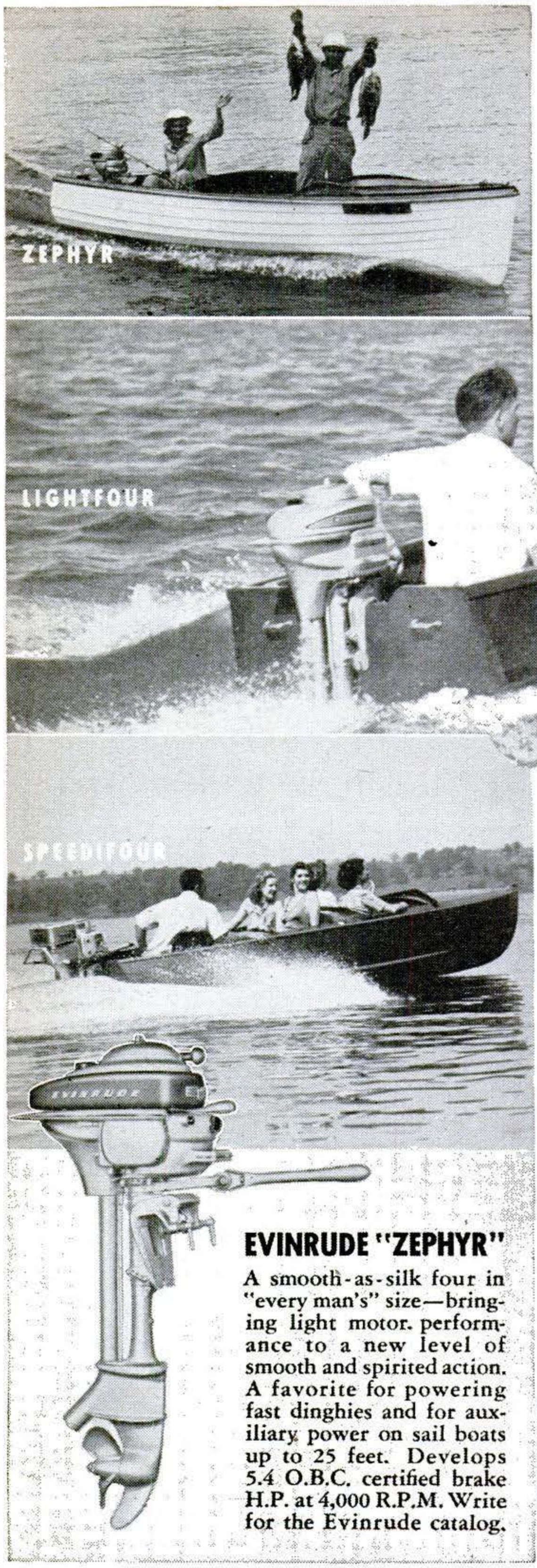
DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Copyrighted material

There's a "Four" for YOU—



—just right in size, power, performance . . . in Evinrude's complete line of 3 thrilling four-cylinder models!

If you want a motor developing 5 horsepower or more — why not enjoy the *extra* smoothness — the *extra* thrill of performance — *that are yours with an Evinrude "four"?*

There's nothing like them — for any boat, or any kind of service! No other type of outboard motor to match their velvety surge of power, their responsiveness and flashing get away!

See your Evinrude dealer — look for his name under "Outboard Motors" in your classified telephone directory. Catalog of the complete Evinrude line of 7 models sent on request. Write for it today—address, EVINRUDE MOTORS, 5562 North 27th Street, Milwaukee 9, Wis.

EVINRUDE "ZEPHYR"

A smooth-as-silk four in "every man's" size—bringing light motor performance to a new level of smooth and spirited action. A favorite for powering fast dinghies and for auxiliary power on sail boats up to 25 feet. Develops 5.4 O.B.C. certified brake H.P. at 4,000 R.P.M. Write for the Evinrude catalog.

EVINRUDE

FIRST IN OUTBOARDS • 38TH YEAR

In Canada: Evinrude Motors, Peterboro, Ontario.

Copyrighted material

RCA Communications' new world-wide automatic tape relay radio system speeds Radiograms.

New wings for words around the world!

Radiograms "Via RCA" to and from overseas points now are processed by automatic machines which speed your messages through such gateway cities as New York, London, San Francisco and Manila, without delay.

This advanced technique in international radiotelegraphy is the result of wartime research and development. It gives to private messages the same speed, accuracy and dependability which were attained through its use by the U. S. Army Communications Service during the war.

RCA Laboratories—one of the world's foremost centers of radio and electronic research—is continually pioneering and advancing radio communications in service to the Nation and the public.

When you buy an RCA Victor radio or television receiver, Victrola radio-phonograph, or phonograph record, you are getting, thanks to RCA research and engineering, one of the finest products of its kind science has achieved.

"Victrola" T. M. Reg. U. S. Pat. Off.

Radio Corporation of America, RCA Building, Radio City, New York 20. Listen to the RCA Victor Show, Sundays, 2:00 P.M., Eastern Daylight Saving Time, over NBC.

At RCA Communications, "Package Sets" contain an automatic sending and receiving unit for a foreign gateway city. Messages in tape form and received through these machines, are ready for delivery or immediate transmission to any part of the world.

RADIO CORPORATION of AMERICA

Copyrighted material

Free...

PHOTOGRAPHIC AND OPTICAL GOODS CATALOG

America's finest photographic equipment and optical goods are on parade in this catalog. 124 big pages (12 in full color)—to serve as your guide in selecting equipment by Eastman Kodak, Ansco, Bell and Howell, Revere, Graflex, Weston and others. Features, also, optical goods by leading makers of precision equipment—Bausch and Lomb, Wollensak, Taylor, etc.

Even more — this is a reference book that snap-shooters and amateurs, alike, will find of value. Contains 15 editorial pages covering "Facts About Coated Lenses", "How To Choose Your Camera," "Flash Synchronization," "Color Photography," "Tips On Developing and Printing," "Tricks in Enlarging"—plus dark room hints, exposure charts, film speed tables, etc.

Shop At Your Ease

Use Time Payment Plan

You can shop from your arm chair, with this authoritative guide. And all equipment featured in the 75th Anniversary Catalog is available on Wards Monthly Payment Plan. Mail Coupon below — NOW!

MONTGOMERY WARD

Chicago · Albany · Baltimore · Denver · Ft. Worth
Kansas City · Oakland · Portland, Ore. · St. Paul

MONTGOMERY WARD PS647

Please send me Wards 75th Anniversary Photographic and Optical Goods Catalog. (Ready about June 1).

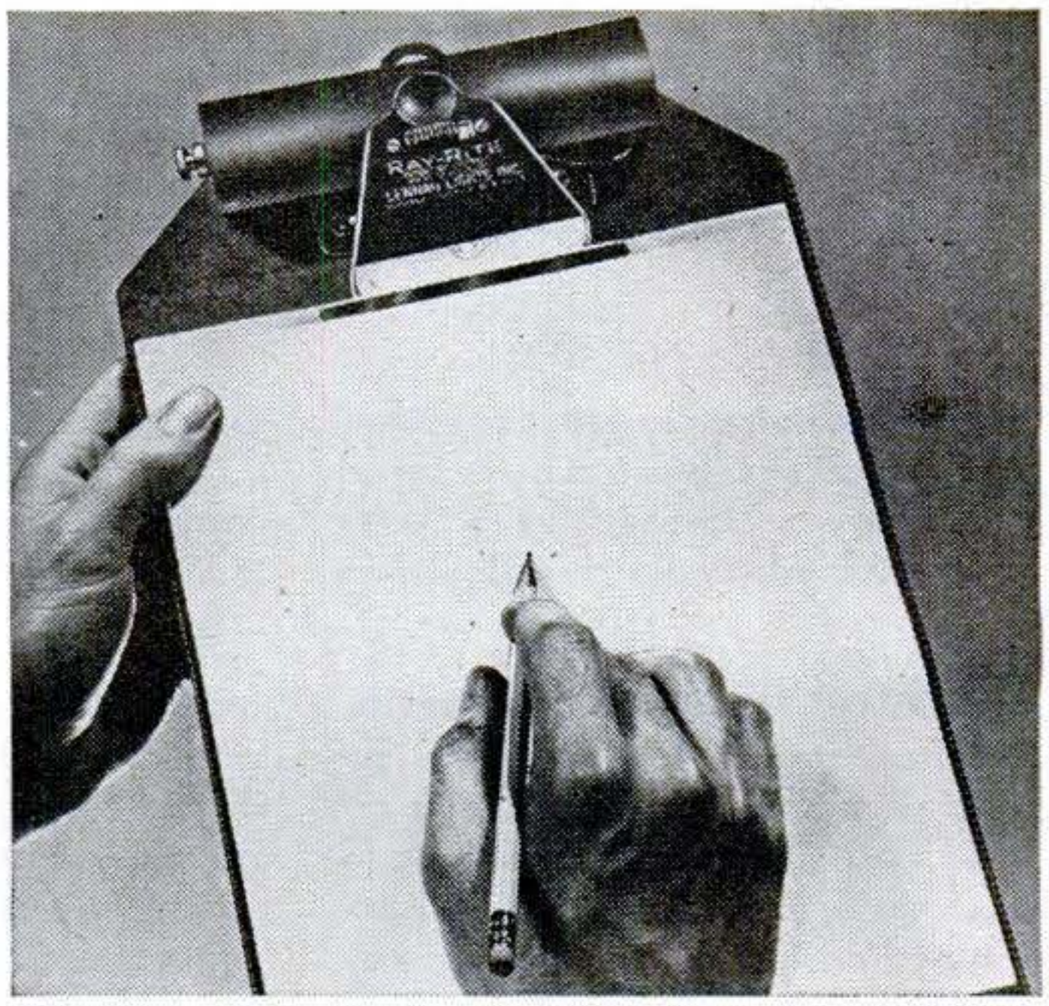
Name.....

Address.....

Postoffice.....State.....

Magnesium Scooter Is Compact

SMALL enough to fit into the average-size automobile trunk yet durable enough to carry full-size adults, this chunky scooter weighs only 75 pounds. Made by McCulloch Motors Corp., of Los Angeles, it is constructed almost entirely of an aircraft-type magnesium alloy, and is powered by a four-horsepower engine. The scooter is equipped with easy-riding balloon tires and a foam-rubber seat.



Clip-board Sheds Own Light

WRITING in poorly lighted areas becomes an easy task with the illuminated clip board manufactured by Lennan Lights, Inc., of Burbank, Calif. Two standard flashlight batteries operate a light bulb set in a reflector that is built into a sturdy metal spring clip. The board is available in two sizes: 7 by 12 inches and 9 by 14 inches.

Copyrighted material

Piston Rings wear out, too

Piston rings are *replacement* parts . . . they're made to "take" the wear . . . to protect your engine . . . to be replaced again and again. And the sooner you replace worn-out rings, the longer your engine will last . . . the better and more economical it will run.

When smoke, excessive oil-consumption and half-hearted engine performance first warn that you need new piston rings, play safe—install Hastings rings, at once. They *stop* oil-pumping and *check* cylinder wear . . . they *restore* engine performance and *prolong* engine life.

Remember that name—Hastings Piston Rings—the best money you can spend on your car.

HASTINGS MANUFACTURING COMPANY, HASTINGS, MICH.
Hastings Ltd., Toronto

HASTINGS
STEEL-VENT PISTON RINGS
TOUGH *on Oil-pumping*
GENTLE *on Cylinder Walls*

Copyrighted material

"We Get Good Results with Jitterbug"

Frog Jitterbug or choice of 5 other colors — $1.21 each. 3/8 or 5/8 oz. same price.

"Dear Fred:

"Enclosed is a picture of a nice mess that were caught on a frog Jitterbug, and a black Jitterbug. They were taken from Orange Lake, near Newburgh, N. Y., at night. The four largest weighed 6 lbs. apiece, and they totaled 46 lbs. We get good results from all patterns of Jitterbugs, especially at night."—Capt. P. C. Harold, S/Sgt. F. M. Stockwell, Newburgh, N. Y.

Bass Strike It Viciously!

Fishermen get a kick out of using the Jitterbug. Its gurgling, paddling action is as fascinating to them as it is to fish. Bass strike it viciously. And the thrill-packed action is right on the surface where you can see and hear it.

Write for Free Catalog

Beautifully illustrated in colors. Contains many photographs and letters from fishermen telling where and how record catches were made with Jitterbugs, my famous surface bait, Hawaiian Wigglers and Hula Dancers. Also available, 16 mm. colored movies for showing to sportsmen's clubs.

FRED ARBOGAST & CO.

1726 North St., Akron 3, Ohio

Capt. Harold and Sgt. Stockwell with their string of bass caught on Frog Jitterbug

Copyrighted material

SPEAKING OF RECORDS by FRANK WILLIAMS

HOLDER OF EVERY OFFICIAL WORLD'S BACKSTROKE RECORD FOR MEN—

ADOLPH (SONNY) KIEFER

...BEATS MOST FREE-STYLERS SWIMMING ON HIS BACK!

I LIKE TO SEE WHERE I'VE BEEN!

...SONNY BECAME A BACKSTROKER BECAUSE AS A KID HE DIDN'T LIKE TO GET WATER UP HIS NOSE.

NOW YOU'RE CATCHING ON!

HE LOOKS SHARP!

...SWIMS SO SMOOTHLY THAT HE SEEMS TO BE ONLY HALF TRYING...THIS EASE, HOWEVER, CONCEALS A FLAMING COMPETITIVE SPIRIT--HE LOST ONLY ONE RACE DURING HIS CAREER!

HE FEELS SHARP!

YOU'LL ALWAYS FIND SONNY IN THE "PINK" AS HE CARRIES ON HIS AMBITIOUS SCHEDULE OF LECTURING AND COACHING TO MAKE AMERICA A "SWIMMINGLY SAFE" NATION !!

...STAN BRAUNINGER, THEN CHICAGO LAKE SHORE A.C.'S SWIMMING COACH, PERFECTED THE UNUSUAL WINDMILL STYLE, WHICH HELPED KIEFER TO WIN 38 TITLES IN 11 YEARS OF NATIONAL COMPETITION!

I FEEL LIKE A MISSISSIPPI STEAMBOAT

look SHARP
feel SHARP
be SHARP

use Gillette Blue Blades
with the SHARPEST edges ever honed!

● You *look* sharp for you enjoy the swellest shaves ever. You *feel* sharp because they're refreshing and give you a lift. You *are* sharp for you get far more shaves per blade and save money. Ask for Gillette Blue Blades.

5 for 25¢

HE IS SHARP!

YES SIR, SONNY KIEFER ALWAYS USES **GILLETTE BLUE BLADES** WITH THE SHARPEST EDGES EVER HONED. THAT'S BECAUSE THEY GIVE HIM THE SLICKEST, MOST REFRESHING SHAVES MONEY CAN BUY. ALSO--HE KNOWS THAT **DOUBLE EDGES MEAN DOUBLE ECONOMY!**

ENJOY BOXING EVERY FRIDAY NIGHT OVER ABC NETWORK. GILLETTE'S CAVALCADE OF SPORTS ALSO AIRS THE ALL-STAR BASEBALL GAME, JULY 8, AND OTHER CLASSICS YEAR 'ROUND.

Gillette Safety Razor Company, Boston 6, Mass.

Copyright, 1947, by Gillette Safety Razor Company

Copyrighted material

BRIGHT STAR BATTERIES

GIVE MORE BRIGHT LIGHT LONGER FOR YOUR 10¢

HERE IS PROOF! BASED ON TESTS CONDUCTED UNDER GOVERNMENT STANDARDS

THREE LEADING BRANDS TESTED	BRIGHT STAR	BATTERY A	BATTERY B
VERY BRIGHT LIGHT	10¢	1¢	10¢
GOOD LIGHT	1¢	10¢	10¢
FAIR LIGHT	1¢	1¢	1¢

Each column adds up to 10 cents, but BRIGHT STAR leads the field with 70% VERY BRIGHT LIGHT.

And that's not all . . . Bright Star batteries give 150% of the Light Industrial Test requirements as specified by the U. S. Gov't Bureau of Standards.

. . . and there are more BRIGHT STAR FLASHLIGHTS sold than any other make. they, too, have been best since 1909!

BRIGHT STAR BATTERY CO.
CLIFTON, N. J.

Plastic Tray Is Easy to Carry

THIS lucite serving tray saves steps for the hostess and minimizes the possibility of upsetting or breaking glasses. Made by the Miracle Patent Co., of Hollywood, Calif., the Sway Tray has a 10- or 12-inch-diameter surface. A knob, joined to the handle by a flexible cord, makes it possible to carry the tray easily with one hand.

Chemical Sticks Help Remove Stains from Fabrics

STUBBORN stains caused by tea, coffee, ink and other substances can be removed from clothing by using two waxlike, chemical sticks. The soiled fabric is laid over a clean undercloth and sponged, and an acidic stick is daubed into it until the undercloth shows no more stain. After the stained area has been sponged again, a reducing stick is rubbed on to remove the spot completely. The stain remover was developed by Carbide and Carbon Chemicals Corp.

Model Builders Attention!

	V	V-2	V-3
Hex	1/2"	3/8"	5/16"
Thread	3/8"-24	1/4"-32	1/4"-32
Thread Length	7/32	7/32	5/32
Weight, Grams	8	3 1/2	2 1/2

Actual Size V-Plug

Champion spark plugs for model gas engines give the same dependable performance as regular Champions. Sillment sealed. Sillimanite insulator. Alloy needlepoint electrodes for easy starting. One piece construction.

CHAMPION
SPARK PLUG COMPANY • TOLEDO 1, OHIO

Copyrighted material

Dependable

CHAMPION

AMERICA'S FAVORITE SPARK PLUG

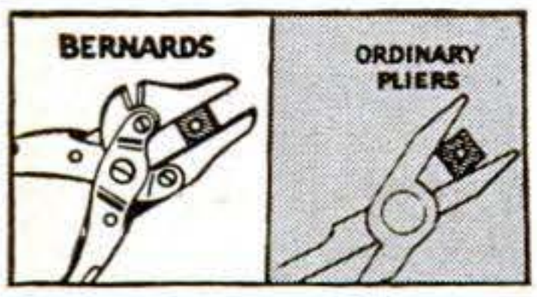
When one make of spark plug consistently stands out above all others in open competition, you may be certain that it will consistently outperform all others in your car. Champion's unequalled record in record-breaking events is constantly being augmented by such exceptional examples as their use in "Miss Great Lakes," owned by Al Fallon of Detroit, which was driven by Dan Foster at record-breaking speeds to win all three heats in the President's Cup Race. Champion is America's Favorite Spark Plug, on land, water or in the air, because it is always dependable for every engine.
Champion Spark Plug Company, Toledo 1, Ohio.

FOLLOW THE EXPERTS—DEMAND DEPENDABLE CHAMPIONS FOR YOUR CAR

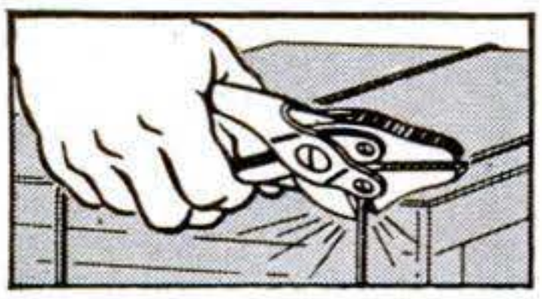
Listen to the CHAMPION ROLL CALL, Harry Wismer's fast sportscast every Friday night, 9:55 EDST over the ABC network

Copyrighted material

There's no other pair of pliers in the world like the Parallel-Action BERNARD. And here's why they're so handy for *you.*



Jaws close parallel—like a vise. Fit snug and flat. Won't slip or mar the nut.



Powerful cutters on the *outside* of the head, easy and convenient to use. They'll cut an 8-penny nail!

Hundreds of thousands of BERNARD's went to war in Yank machine gun kits, but, once again, they're available to you at your local hardware store.

Look for the name "BERNARD"

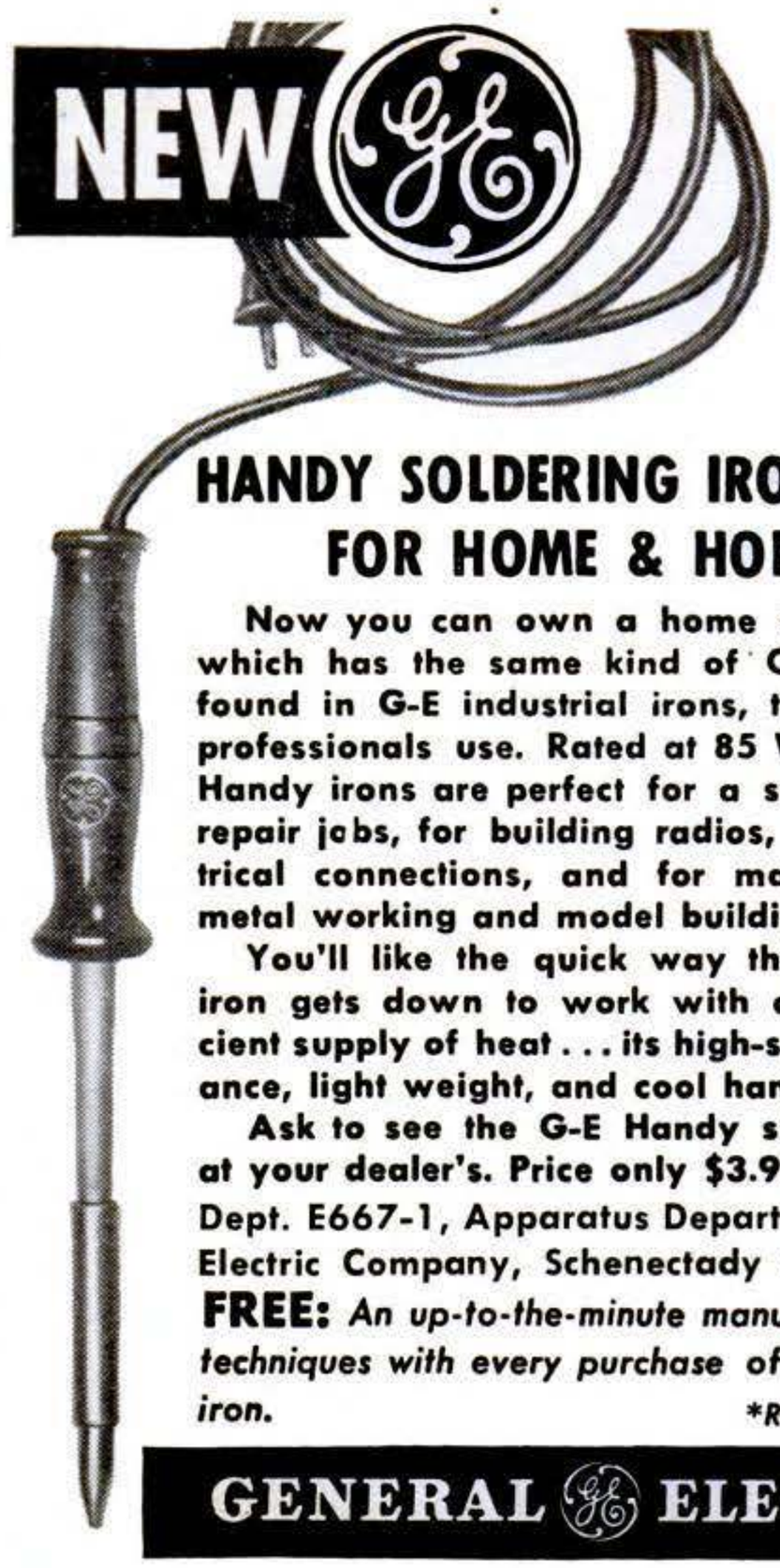
BERNARD Parallel-Action PLIERS are one item in a line of fine hand tools—hedge clippers, pruners, paper and leather punches, etc.—known for quality for 75 years. *Free catalog on request.*

QUALITY TOOLS SINCE 1870

BERNARD

TRADE MARK REGISTERED

WM. SCHOLLHORN CO.
7006 Chapel Street, New Haven 9, Conn.



HANDY SOLDERING IRON FOR HOME & HOBBY SHOP

Now you can own a home soldering iron which has the same kind of Calrod* heater found in G-E industrial irons, the irons that professionals use. Rated at 85 W, 115 V, G-E Handy irons are perfect for a score of home repair jobs, for building radios, making electrical connections, and for many kinds of metal working and model building.

You'll like the quick way this G-E Handy iron gets down to work with a steady, efficient supply of heat . . . its high-speed performance, light weight, and cool handle.

Ask to see the G-E Handy soldering irons at your dealer's. Price only $3.95. Or write to Dept. E667-1, Apparatus Department, General Electric Company, Schenectady 5, N. Y.

FREE: *An up-to-the-minute manual on soldering techniques with every purchase of a G-E Handy iron.*

**Reg. U.S. Pat. Off.*

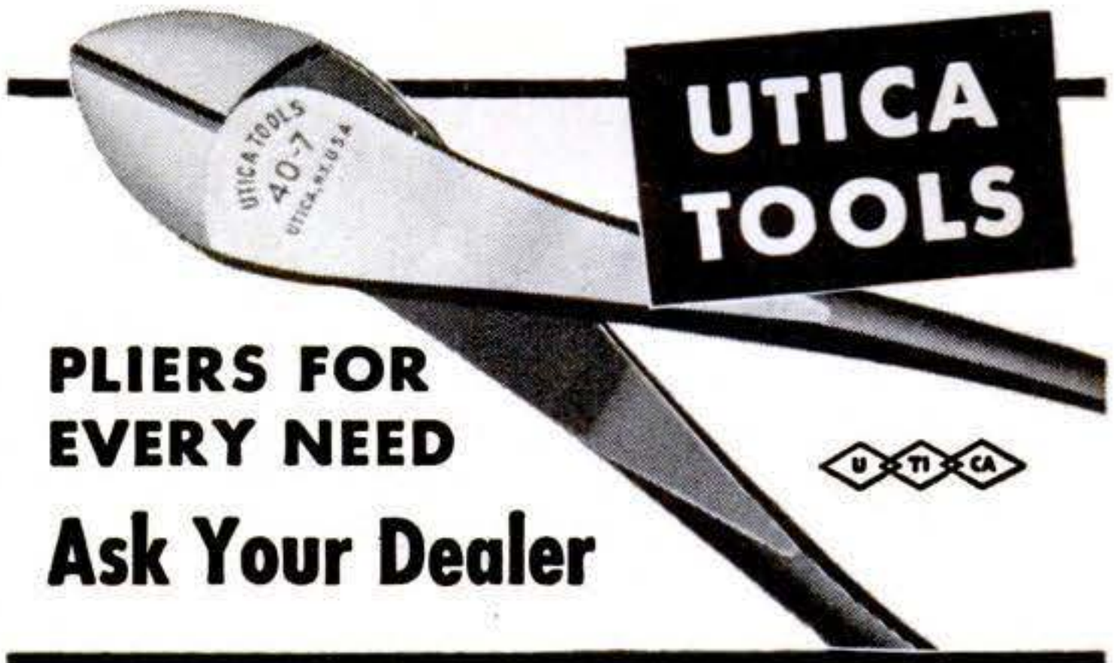
GENERAL ELECTRIC
667-1V-194

10¢ FOR THIS PLAN (and four others!)

STANLEY

PLAN SET No. 14

• FIVE EASY WAYS to improve your grounds and have fun . . . artistic bird houses, trellis and garden seat. 5 complete plans for just 10c. Drawings fully detailed, step by step. Send for Set No. 19 and free list of Plan Sets. STANLEY TOOLS, 267 Elm St., New Britain, Conn.



PLIERS FOR EVERY NEED

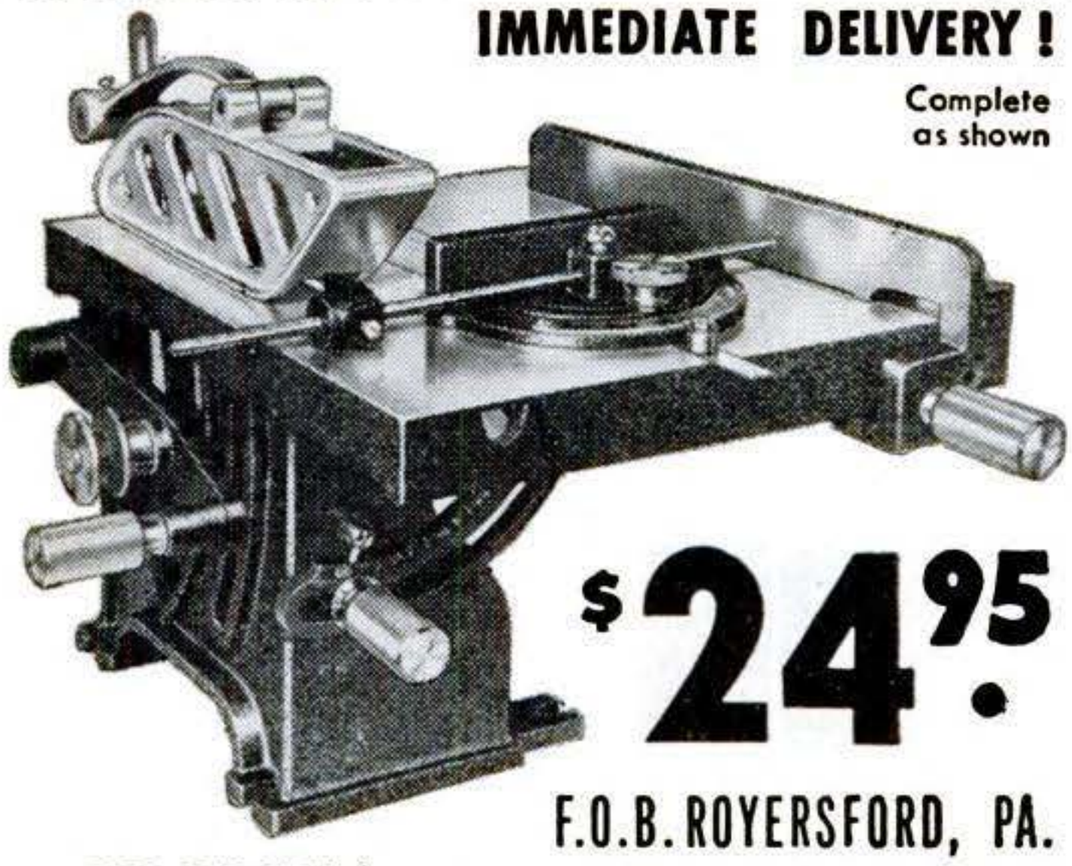
Ask Your Dealer

UTICA DROP FORGE & TOOL CORP.
UTICA 4, NEW YORK

Copyrighted material

IMMEDIATE DELIVERY!

Complete as shown



$24.95

F.O.B. ROYERSFORD, PA.

QUALITY 8" BENCH SAW

CUTS THROUGH 2 5/16"

UNCONDITIONALLY GUARANTEED ONE YEAR

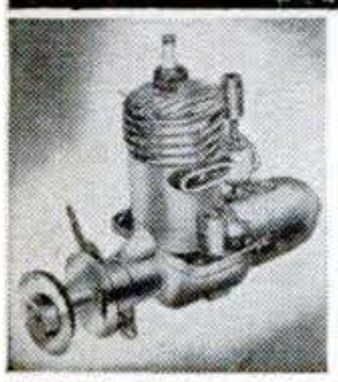
(Write for Free Booklet and Guarantee Bond)

Comes complete with Floating motor mount—miter gauge with adjustable stop—aluminum guard—soft aluminum insert—spring steel splitter—heavy gray iron fence—(no motor—no blade). Table 12" x 14". Tilts to 45°—Oilite bearings. Shipping Wt. 50 lbs.

AMERICAN MACHINE & TOOL CO. Inc.

DEPT. 200 ROYERSFORD, PA.

New THOR "B" ENGINE-$6.95



The new THOR "B"—Sensational miniature gasoline engine that **really** works. Super-power performance. Smooth, velveted power that roars into action with a "twist of the wrist." Over 20,000 already sold. 1/6 H.P. Complete with coil and condenser. Ready to run, only $9.95. In KIT form, fully machined, 5 minutes to assemble, $6.95, without coil and condenser. Powers all models. Fully illustrated instructions. Send $1.00—shipped collect same day C.O.D.

FREE. SEND FOR 24-PAGE ILLUSTRATED HOBBY CATALOG.

AMERICA'S HOBBY CENTER

DEPT. S67, 156 WEST 22ND STREET, NEW YORK 11, NEW YORK

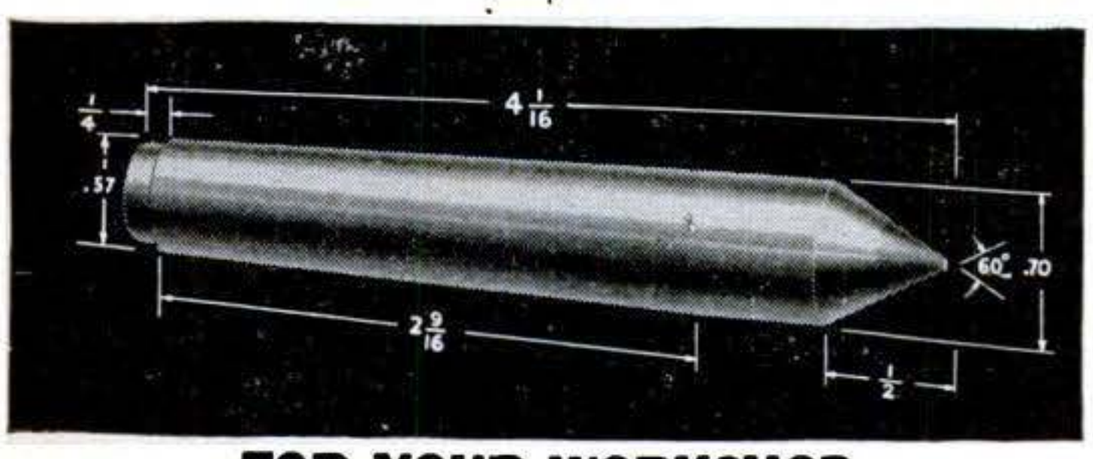
arc welding manual *and* text book...$2.00

• Teaches you how to become an arc welding operator – one of highest paid trades today. Write today!

Hobart Bros. Co., Box P-562 Troy, Ohio

CARBIDE TIPPED LATHE CENTERS

$2.95 EA.



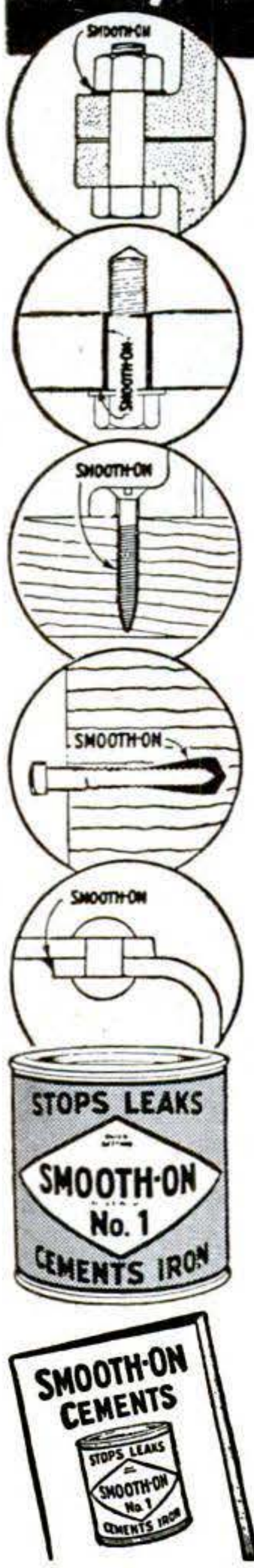
FOR YOUR WORKSHOP

NO. 2 MORSE TAPER CENTER

POSTPAID IN U. S. A. • CHECK or M. O.

DRAFTO CORP., COCHRANTON, PA.

BOLTS, SCREWS, RIVETS *Tightened to* STAY



Tighten loose bolts, nuts, screws, rivets, parts and fixtures with Smooth-On No. 1 Iron Cement. They will stay tight, because Smooth-On expands slightly as it hardens. You apply it like putty, no heat required. It hardens like metal.

Use it, too, to seal cracks, stop leaks in heating and plumbing systems, autos, etc. It can often save you a lot of trouble and expense.

Keep Smooth-On handy for emergencies. Buy it in economical 1¾ oz., 7-oz. or larger size at your hardware store. A little goes a long way. Does not deteriorate in container. If your store hasn't Smooth-On No. 1, write us.

REPAIR HANDBOOK FREE

Practical, tested, time-and-money-saving directions for making metal repairs of many kinds around the house and garage. 40 pages. 170 diagrams. Send the coupon for *your* free copy.

Sign and Send Now

SMOOTH-ON MFG. CO., Dept. 58F,
570 Communipaw Ave., Jersey City 4, N. J.

Please send me a Smooth-On Handbook.

NAME.....

ADDRESS.....

6-47 .....

Do it with **SMOOTH-ON**

Iron Cement of 1000 Uses

Copyrighted material

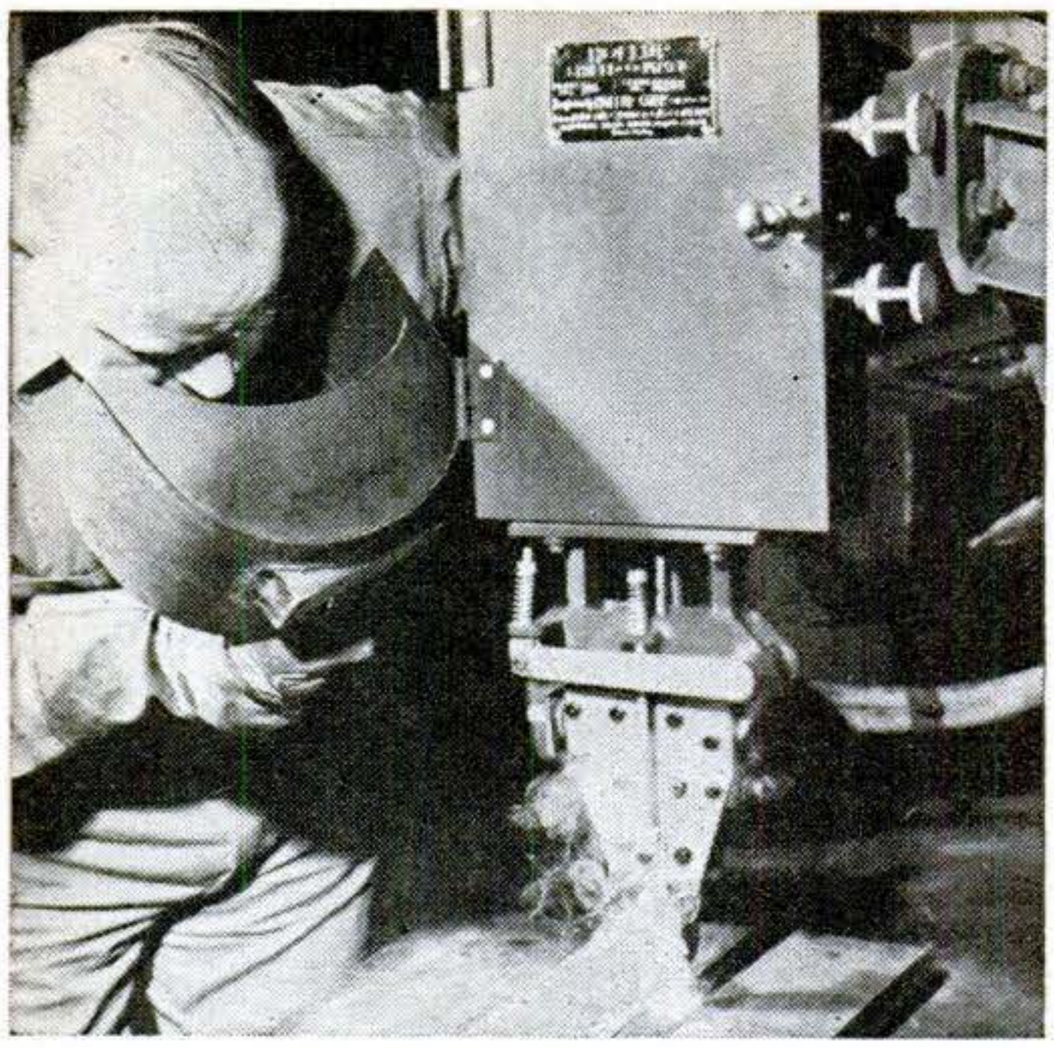


FIGURE 1

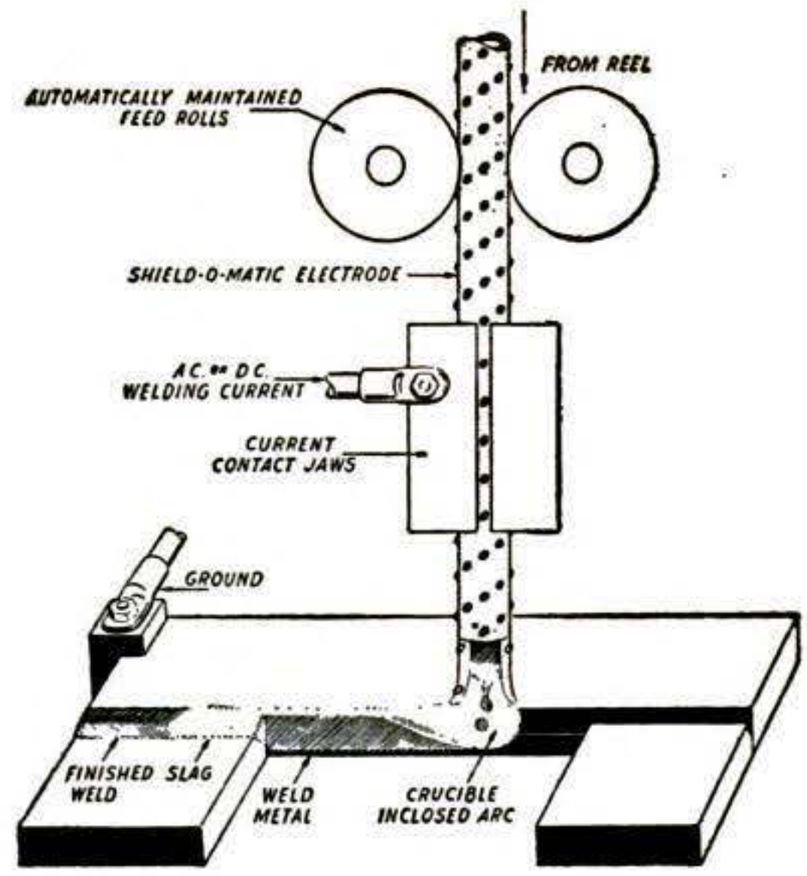


FIGURE 2

Welding Electrode Improved

A NEW automatic welding electrode, which can be bent or twisted without loss of its flux coating, has been developed by the Hollup Corp. Because metallic parts and flux are combined (Fig. 1, in diagram) to produce a crucible-enclosed arc, flare is reduced (as demonstrated above, left), and more uniform welds are possible. Fed continuously from a reel (Fig. 2), the Shield-O-Matic electrode also permits conduction of unusually high currents, causing faster fusion with base metal. Slag, caused by flux not converted into vapor, settles on the welded metal and slows cooling long enough to allow impurities to float to the surface, where they are then absorbed by the slag.

"There's something about a Sportsman"

Full Bent Shape

The man who knows his dogs, or horses —or pipes, recognizes almost instinctively the fine points of a champion. For instance, this one!

SPORTSMAN

Champion of Pipes

From $5 to $15, at better stores. Write for booklet illustrating available shapes and styles. Address Dept P-2, John Hudson Moore, Inc., 663 Fifth Ave., N. Y. 22

Copyrighted material

IT'S A GRAND FEELING TO BUILD A MODEL SHIP

IT'S A GRAND FEELING, TOO, WHEN YOUR CAR IS CUSHIONED WITH MARFAK CHASSIS LUBRICATION

THAT CUSHIONY FEELING LASTS LONGER WITH **MARFAK!**

It's a grand feeling to build a model sailing ship . . . the same grand feeling you get from your smooth riding, *Marfak* lubricated car.

***Marfak* is scientifically designed to cling to bearing surfaces, resist wash-out, jar-out and squeeze-out and stick to the job for a thousand miles and more. See your Texaco Man today, and get that grand feeling with a *Marfak* lubrication job.**

THE TEXAS COMPANY

TEXACO DEALERS IN ALL 48 STATES

Tune in: TEXACO STAR THEATRE presents the new TONY MARTIN show every Sunday night. See newspaper for time and station.

Copyrighted material

THE METEOR
(It's a UNIVERSAL)

. . . and only $15.00!

Here it is, Universal's smart new, low-priced camera with twelve (count 'em – 12) high-cost, "professional" features. It's the perfect camera for photo-eager folks who want to start on the streamlined path to a great photo-future!

STREAMLINED DESIGN! All-metal construction – satin-finish aluminum – with smart pebble-grained cover.

COATED LENS! For clear, sharp pictures every time!

ADJUSTABLE DIAPHRAGM! For better pictures under any light conditions!

COLLAPSIBLE LENS MOUNT! Ready for action at the twist of the wrist!

ROTARY-FOCUSING MOUNT! No special attachments necessary for close-ups, landscapes, etc.

BUILT-IN LENS SHADE! Protects pictures from glare!

BUILT-IN EXPOSURE METER, CALCULATOR! Makes it easy to get proper exposures every time!

BUILT-IN SYNCHRONIZED FLASH! Get those "professional" indoor shots!

OPTICAL VIEW FINDER! See what you're getting before you shoot!

CHAMBER LOADING! Takes standard 620 film in a unique chamber-loading device.

TRIPOD SOCKET!

SQUARE PICTURES! 2¼x2¼ exposures mean no gymnastics – camera never needs to be re-oriented!

See the *METEOR* at your dealer's

MERCURY FLASH UNIT
—for use with built-in synchronizer
$7.30

Sturdy, ever-ready carrying case
$5.00

UNIVERSAL CAMERA CORPORATION

NEW YORK CHICAGO HOLLYWOOD

Manufacturers of Cinémaster and Mercury Cameras and other Photographic Equipment

---

WORLD'S most POWERFUL most USEFUL Hand Tool

Gives 1 Hand a TON-GRIP

Does more jobs easier, quicker. For "impossible" jobs, where other tools fail, VISE-GRIP is invaluable. Gripping power easily exceeds a ton. Locks to the work with hands removed. Holds anything, any shape. Super-plier action. Ask for genuine VISE-GRIP, the original toggle-wrench—strongest made, never equaled. Wider range of jaw adjustment than any other type. Built of fine alloy steel. Nickel plated. Two sizes: still only $1.65 and $1.95.

Sold thru Tool Jobbers and Dealers

Invented, Developed and Made World-Famous by

PETERSEN MFG. CO., Dept. 35, DeWitt, Nebr.

★PRICE REDUCTIONS★EXPANDED STOCKS★

Aluminum flats to 4", squares, rounds, hexagons, angles, tubing. Drill rod in rounds, squares, flats and octagons. Plastic in sheets, rods and tubing, clear and color. Also Decorative Panels. Many other items. Listing (A47) on above **5c.** Catalog 1046-D and Listing A47 which lists tools, supplies, equipment, etc. **15c. METLPLAS SUPPLY COMPANY, 1420 South 16th, Maywood, Illinois.**

MOTORCYCLISTS

★ ★ ★ ★ ATTENTION!

The B & H Footshift for all Harley's eliminates hand gear shift, gives fast getaway, greater maneuverability, maximum driving safety. Improved clutch lever booster. Easy to install. Write for details, prices.

SCIENTIFIC RESEARCH CO. 1618 N. Vancouver Portland 12, Ore.

AMAZING NEW

MAGNETIC JIG SAW!

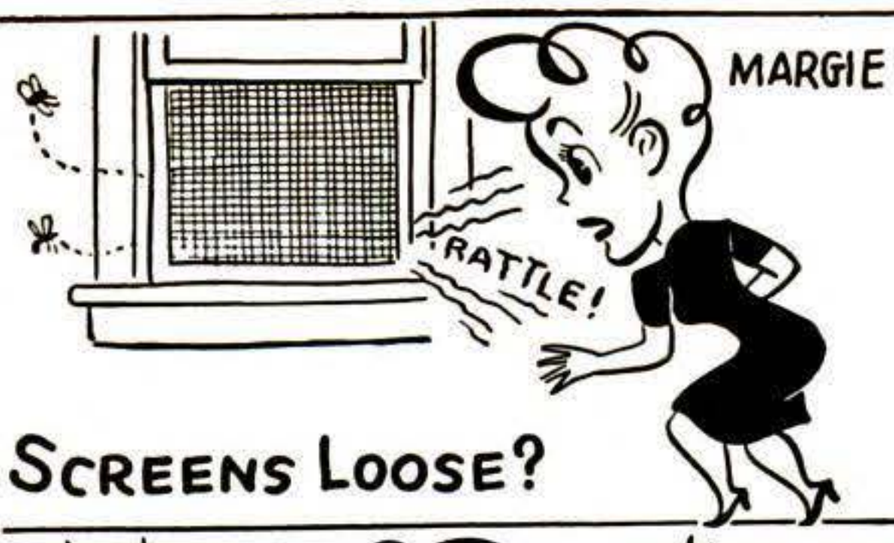
Ready for Delivery!

WRITE FOR FREE SYNCRO CIRCULAR

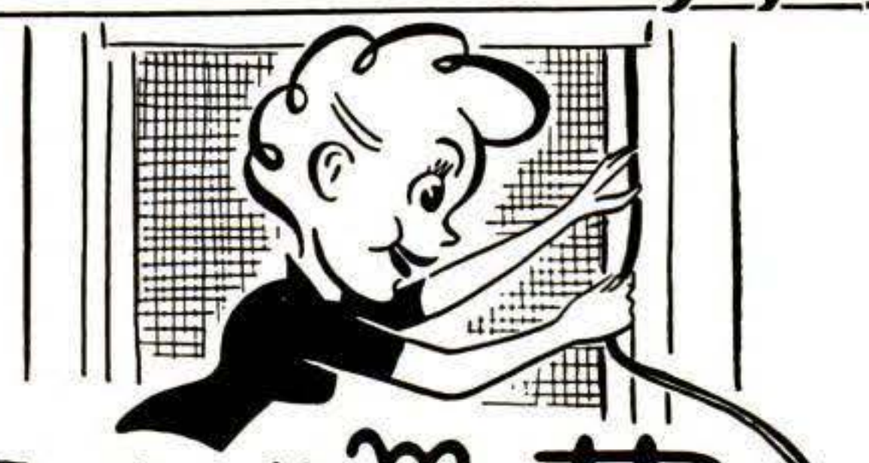
SYNCRO . . . new, remarkable, patented, magnetic jig saw . . . needs no belts . . . no motor . . . no gears . . . no oiling! Just plug into any 60 cycle A.C. 110-130 volt outlet—and saw! Portable . . . world's safest saw! Cuts clean, smooth . . . no sanding necessary! Ideal for hobbyists, craftsmen, light production. Perfect for models, displays, inlays, etc. Cuts intricate designs on ¾" soft wood, ½" plywood and thinner hardwoods, metals, plastics . . . **NOT** for ordinary lumber. Leaves NO ragged undersides on plywood or heavy cardboard. Special magnetic safety stroke features! Nothing else like it! Sold on 10 days Moneyback Trial! Prompt delivery guaranteed. Rush name, address on postcard for FREE details, Trial Offer. Hurry!

SYNCRO SAW CORP. Dept. B-67 Rochester, Mich.

Copyrighted material



SCREENS LOOSE?



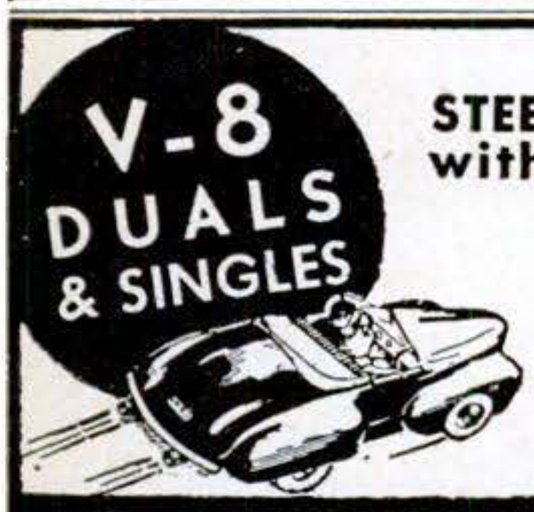
Fix it with Mortite

a household friend

Fills cracks around screens, casements, sinks, baseboards, etc. Fine for calking; keeps out dirt, dust, insects. Stops rattles. Ideal weatherstripping. Easy to apply, just press into place. Roll covers about 80 ft. At Hdwre., Paint, Dept. Stores and Lumber-yards. Write for booklet.

$1.25 Higher West of Rockies and Canada

J. W. MORTELL CO., 534 Burch St., Kankakee, Ill.



MUFFLERS

STEELS and ALUMINUMS with a motorboat tone

SINGLES, Chev, V-8, Plymouth, Steels $5.50, Aluminum $6.50, Chry., Olds., Buicks, etc., Steels $7.50, Aluminum $8.50. V-8 and MERCURY DUALS, Steel $17.50, Aluminum $20.00. Aluminums are guaranteed for life of your car.

DEALERS WANTED

SANDEE MUFFLER CO.

7523 S. WESTERN AVE., LOS ANGELES 44, CALIF.

SEALED POWER PISTON RINGS

save oil, save gas, restore original power

Send postal for free booklet on oil-saving.

SEALED POWER CORP., DEPT. H6, MUSKEGON, MICH.

ONE-MAN SAWMILL

LESS THAN $200.00

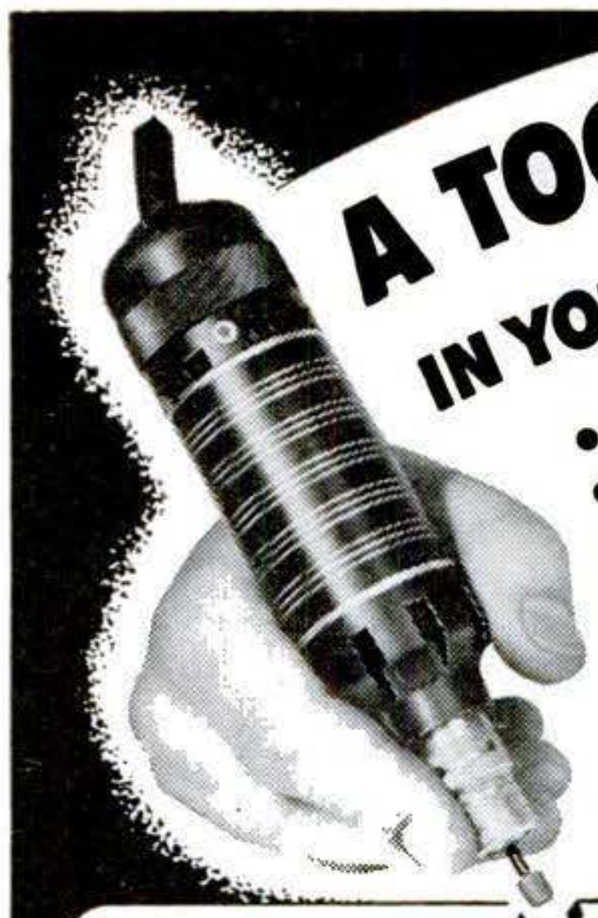
EASY to TURN TREES INTO MONEY —*BELSAW* MODELS in 10 to 24 foot sawing lengths. **MECHANICAL FEED** —accurate set works and positive dogs. Use tractor or old auto engine for low cost power. Thousands used for commercial sawing. It pays for itself quickly.

Makes lumber, ties, shingles, crates, lath, studding, siding.

*Mr. Nettleton of Calif. reports . . . "Have sawed over 5 million feet of lumber since I got my **BELSAW**, selling it at $35.00 per M. B. M."*

Send postcard today for **FREE** booklet, **"HOW TO MAKE LUMBER"** and Catalog of Woodworking Equipment.

BELSAW MACHINERY CO., 1846YS Field Building, 315 Westport Road, Kansas City 2, Missouri



A TOOLSHOP IN YOUR HAND!

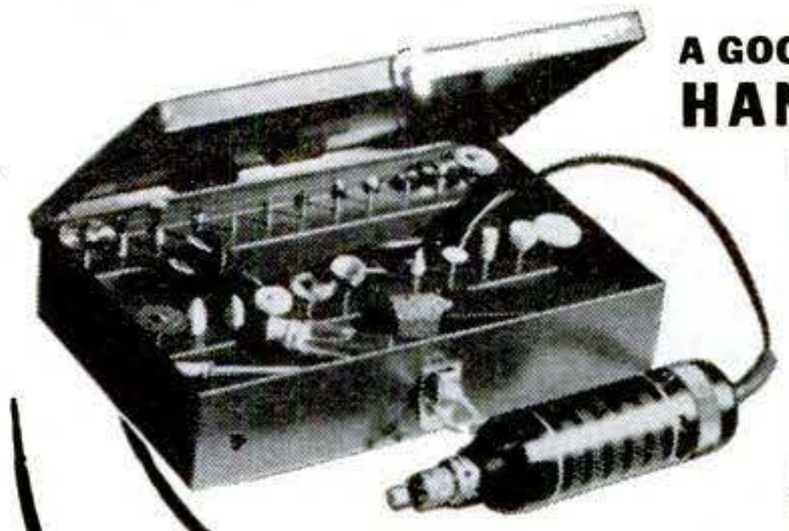
• GRIND • DRILL • ROUT
• POLISH • ENGRAVE
• CUT • SAND • SAW • etc.

MAKE THINGS FROM WOOD PLASTICS—METALS—GLASS LINOLEUM—LEATHER ALLOYS—HORN—STONE BONE, etc.

HANDEE TOOL OF 1001 USES

Smooth, steady power at your fingertips! Perform precision operations not possible with any other portable tool! With a Handee you can turn out professional looking projects for pleasure or profit—ship, plane and train models, costume jewelry, wood carvings, puppets, initialed tumblers, etc. AC or DC. 25,000 r.p.m. Wt. 12 oz.

USE THE RIGHT ACCESSORIES! Choose them from the most complete line . . more than 500 made right in the Handee plant.



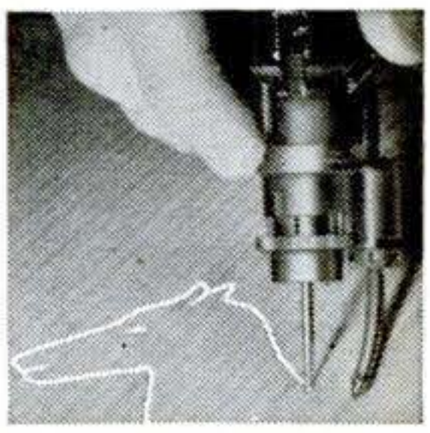
A GOOD START—THE HANDEE KIT

HANDEE Tool and 40 most popular accessories packed in compact steel carrying case. You'll be amazed at what you can accomplish! Complete, postpaid. **$27.50**

Handee only, with 7 accessories, $20.50

FOR YOURSELF OR A FRIEND . . . THE GIFT OF A LIFETIME!

NEW PRECISION ATTACHMENTS Fit Handee only, enable novice or craftsman to do perfect work. Magically, easily, your offhand carving, routing, shaping will be exact as to depth of cut, accuracy of line. Set of 6 attachments with instructions, postpaid **$7.95**



ORDER NOW! SATISFACTION GUARANTEED!

FREE! NEW 52-PAGE MANUAL

CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St. Dept. PO. Chicago 7, Ill.

Send ☐ Handee Kit ☐ Handee Tool ☐ Precision Attachments ☐ C.O.D. ☐ Remittance enclosed ☐ Send Manual

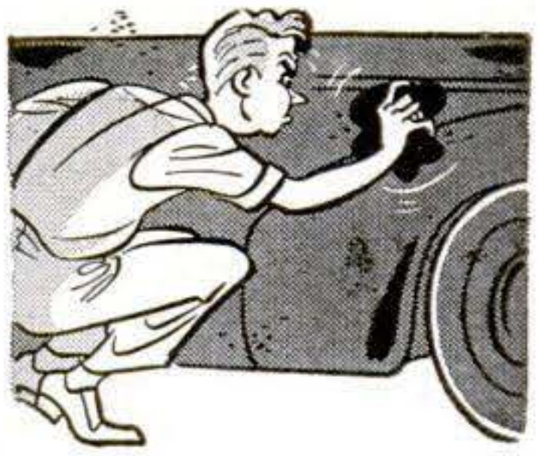
Name . . . . . .

Address . . . . . .

. . . . . .

Copyrighted material

You needn't get



A "charley-horse"

For ease and speed

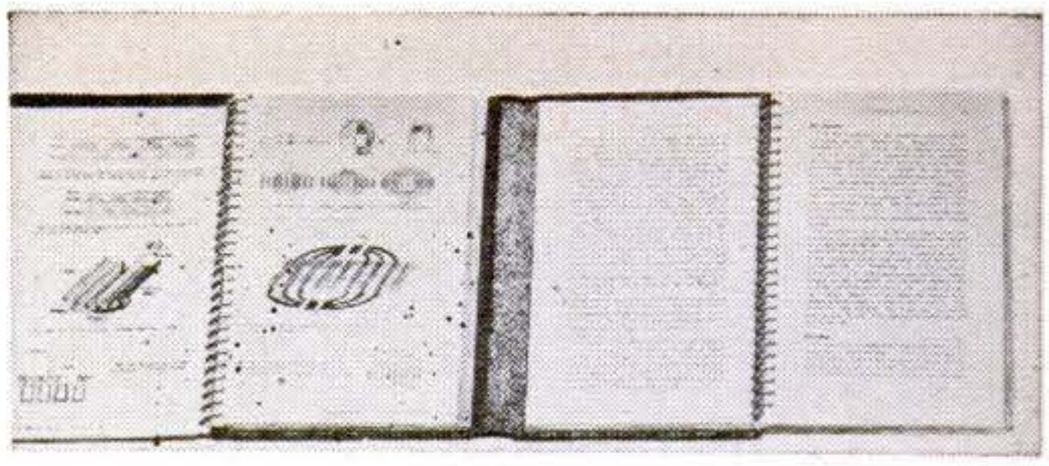
Use this of course

Removes dull traffic film—restores the original color and lustre—quickly, easily and safely.

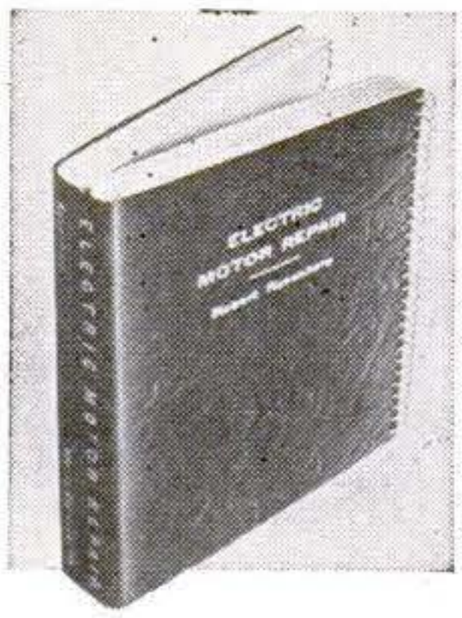
DU PONT

REG. U. S. PAT. OFF.

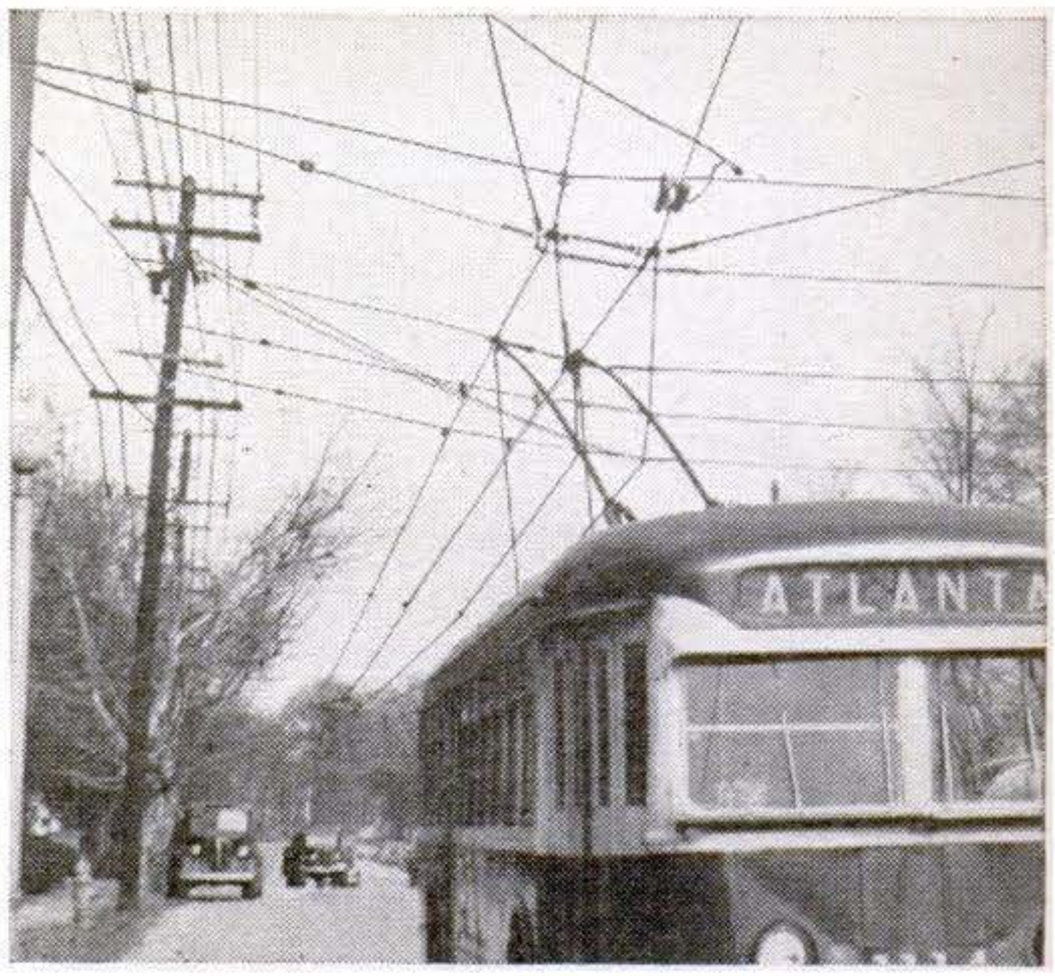
Nº 7 POLISH



Book Binding Simplifies Use



DESIGNED as a working guide for students and mechanics, a new manual entitled "Electric Motor Repair," by Robert Rosenberg, has a binding as practical as its contents. Published by Rinehart & Co., a two-section arrangement permits the text and related illustrations to be brought together (top picture) for simultaneous study. Spiral metal bindings let the open sections lie flat. The book's large type is readable at a distance.



Trolley By-pass Speeds Ride

TO SPEED up trackless trolley service in Atlanta, the Georgia Power Co. has installed extra sets of overhead wires at points in the single-line system where the express trolleys overtake the locals. Permitting the faster express to by-pass a local, these overhead sidings, extending for 250 feet and automatically operated by electric switches, power the trolley until it has passed the local and returned to the main track.

Copyrighted material

When you're glad you have a

Snap-on

Snap-on's Blue-Point

VALVE COMPRESSORS

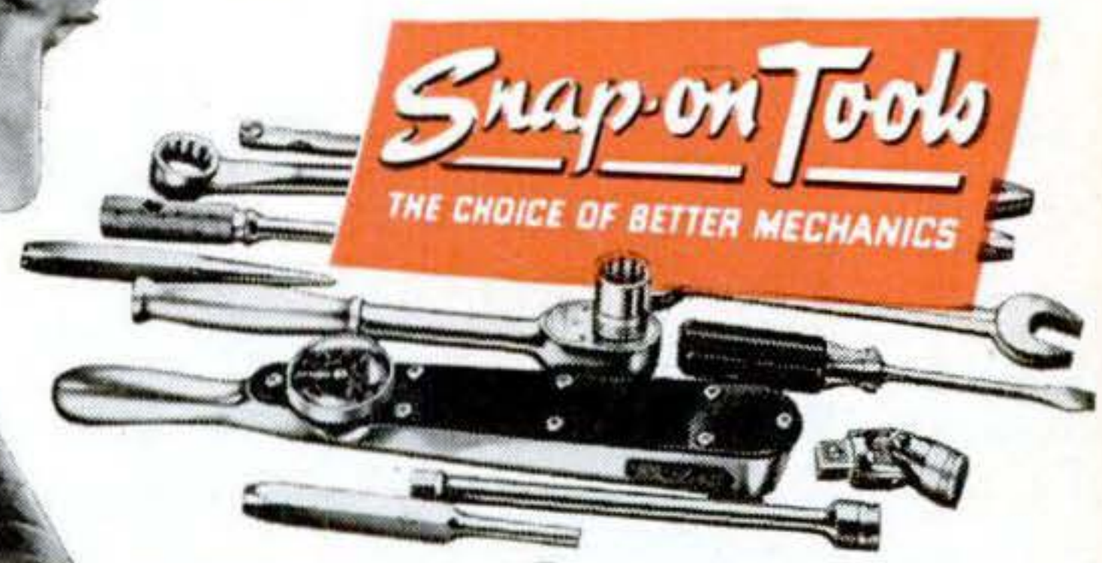
remove the stiffest valve springs easily . . . safely

Here is one of the most practical lifters on the market today. Universal in its scope, this valve spring compressor works efficiently on many different makes of cars.

Check these important features: It's fast and easy to use because the handle is in the most convenient place for simple, downward lever action . . . it's light in weight . . . and it has stronger, slimmer, channel-formed, adjustable jaws for all types of springs. In addition, the handle locks at any position by use of the sliding ring on the lower part of the frame.

Available through Snap-on's nationwide direct-to-user tool service.

SNAP-ON TOOLS CORPORATION
8060-F 28th AVE. KENOSHA, WIS.



Copyrighted material

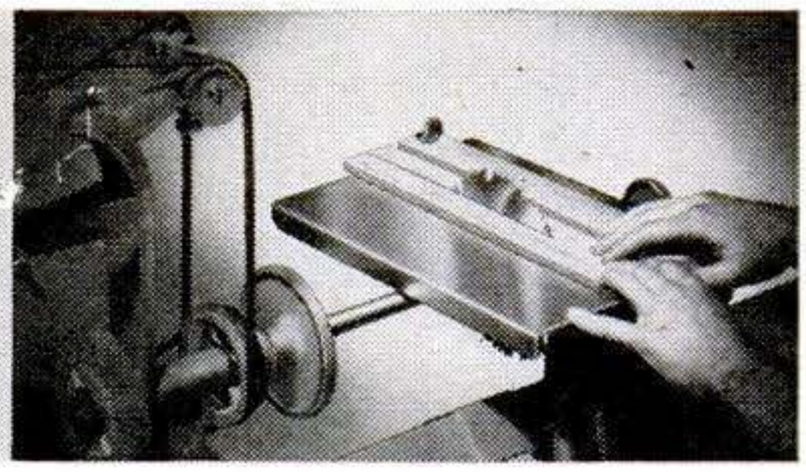
COMPLETE HOME WORKSHOP

LATHE 10" swing, 30" between centers, ¾" spindle, face plate, spur center, tool rest.

$34.95

SAW

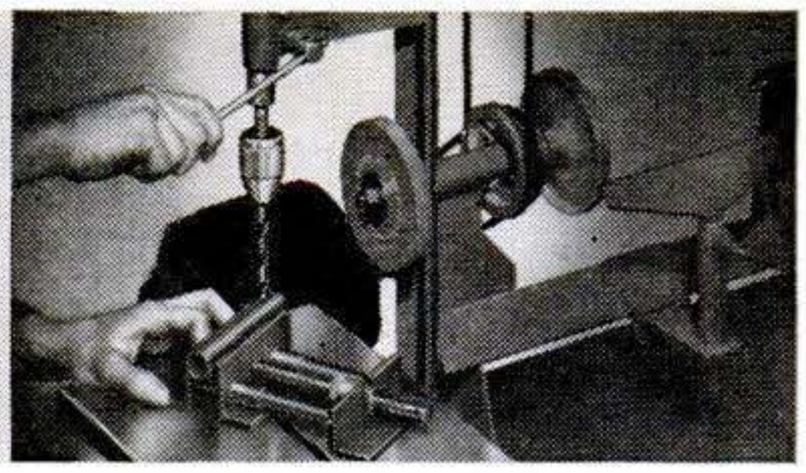
Takes 6" to 8" blade. Arbor handles scratch brush, grinder, buffer. Saw blade not included.



DRILL PRESS

Takes drills to ½". 2" travel, ½" spindle.

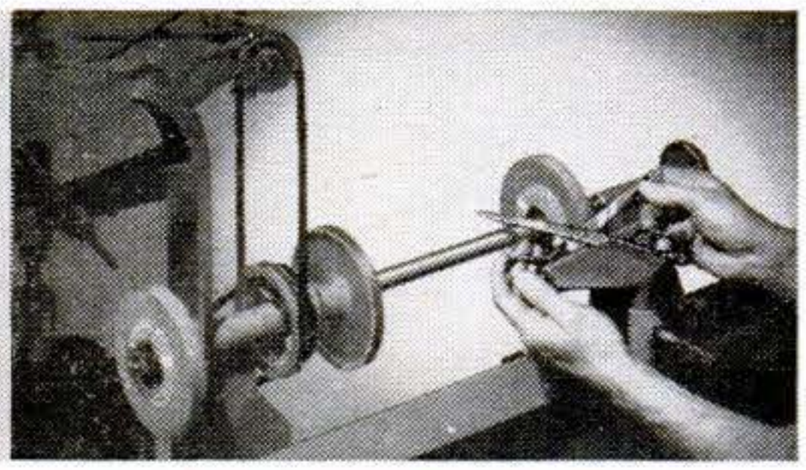
Drills to center of 12" circle.



GRINDER

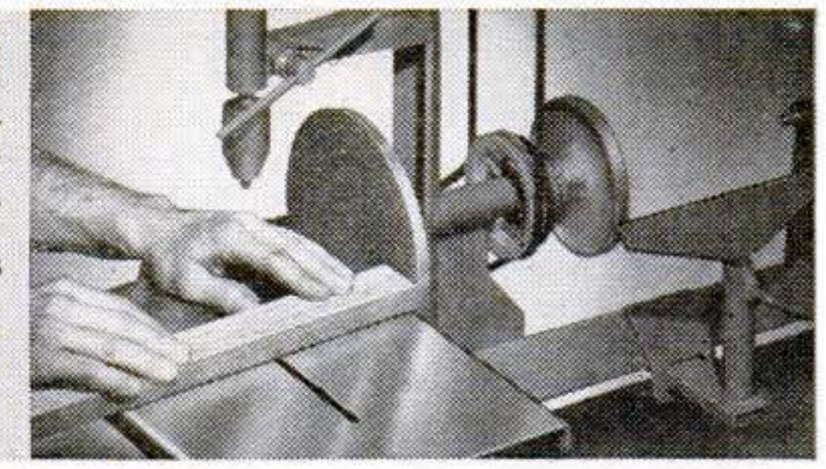
5" Emery wheel furnished. 4 step cone pulley.

Spindles mounted in replaceable bronze bearings.



SANDER

8" diameter disc takes any type abrasive. Heavy construction lasts for years. Motor not included in price.



10 DAY TRIAL

EMRICK, Inc., 1756 Clinton St., Kalamazoo 24, Mich.

☐ Ship on 10 Days Trial. I am enclosing $17.50, balance C.O.D. ☐ Send Free Literature ☐ Send Free Tool List

NAME_____

ADDRESS_____ CITY_____

Completely New and COMPLETE*

Federal's Low Price INCLUDES A Highly Corrected Enlarging Lens

When you examine the price tags of the new Federal Enlargers remember that the price on the tag is *for a complete enlarger . . . LENS AND TAX INCLUDED.*

For Federal's low prices are not arrived at by stripping off important enlarger parts and listing them as separate items in order to give the impression of low price.

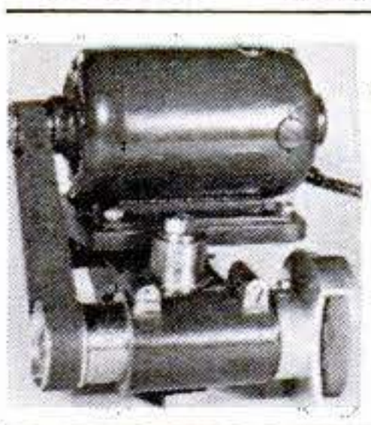
Federal's prices are low! . . . the result of years of specialized experience in designing and building "America's Fastest Selling Enlargers" . . . undeniably America's greatest enlarger values.

MODEL 312. For miniature to 2¼" x 3¼" negatives. Fedar: 3½" F:6.3 Anastigmat with Iris Diaphragm.

Complete with lens **$53.00**
Tax Included

FEDERAL

FEDERAL MANUFACTURING & ENGINEERING CORP.
Makers of Photographic & Electronic Devices
213 STEUBEN STREET • BROOKLYN 5, N. Y.



BUILD YOUR OWN

Tool-post Grinder

FROM OUR

PRINTS, CASTINGS & PARTS

PRINTS AND CASTINGS -- ONLY $12.00

Send for Free Illustrated Circular

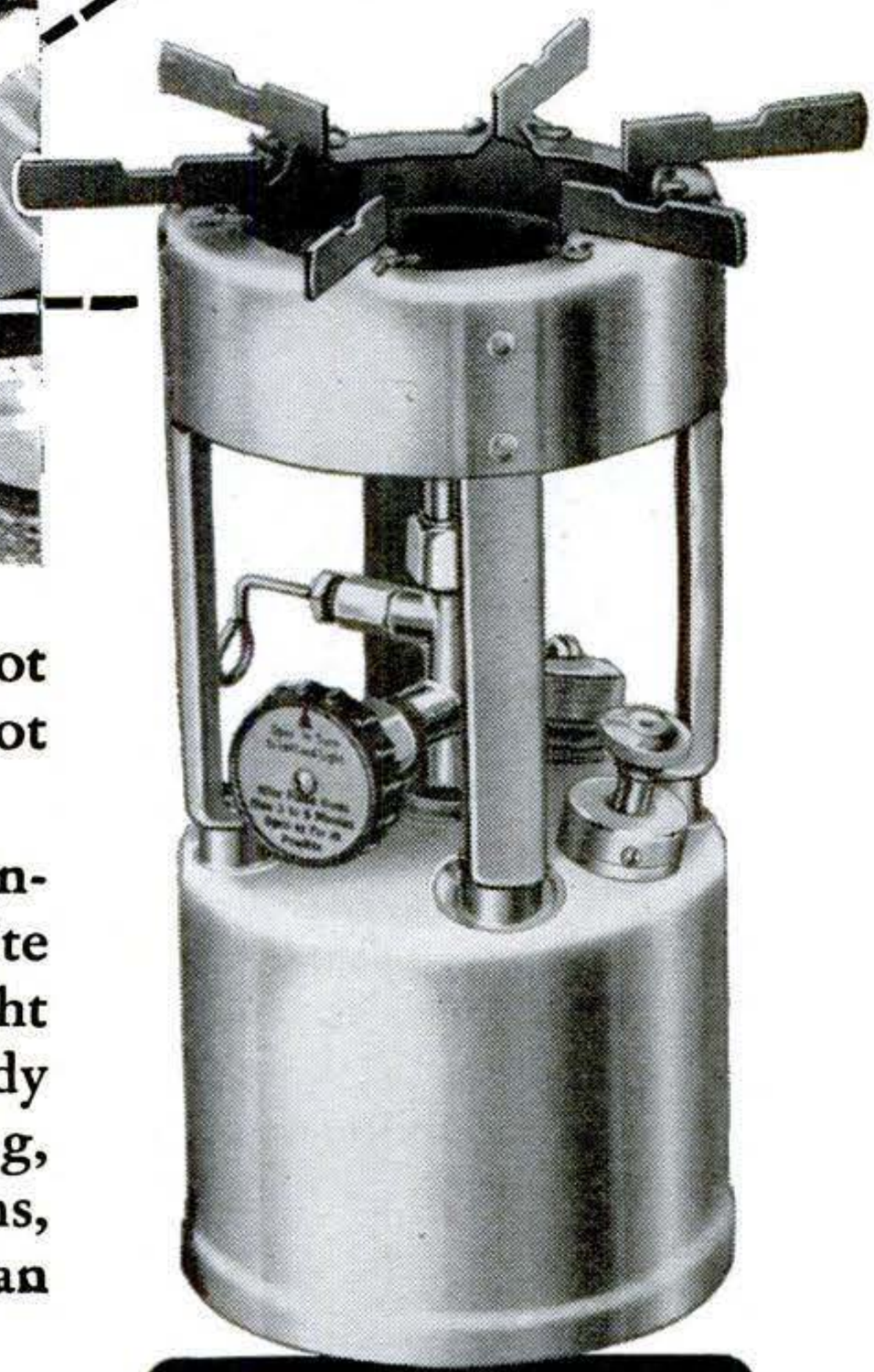
WORKSHOP TOOLS, Box 518, Merrick, N. Y.

PROPULSION ENGINE CORP.
Dept. 301 7th & White Eagle Rd.
Kansas City, Kansas

Copyrighted material

More Fun

Cook 'Em Where You Catch 'Em

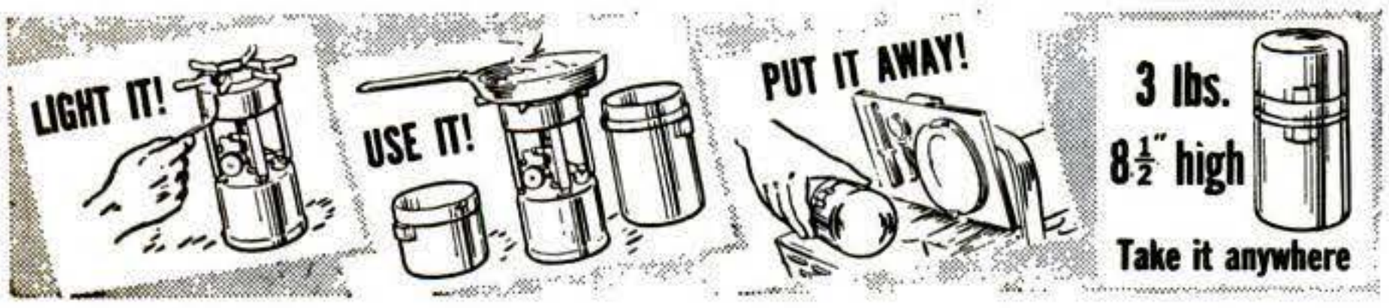


Here's the handy, ready-on-the-spot stove every outdoorsman needs... for hot food or a pot of hot coffee in a jiffy.

The Coleman Pocket Stove lights instantly. Burns any kind of gasoline—white or leaded. Boils a quart of water in eight minutes. Aluminum case makes two handy cooking utensils. Perfect for hunting, fishing, camping trips, picnics, vacations, in the home workshop. Ask your Coleman dealer for a demonstration.

Coleman

POCKET STOVE



Coleman

FOLDING CAMP STOVE

Like Having a Miniature Gas Range

when you have a quick-cooking Coleman Folding Camp Stove. Instant lighting. Carries like a suitcase. See it at your dealer's.

Floodlight Your Entire Camp

with a Coleman Floodlight Lantern. Its powerful brilliance makes night fishing and camp chores easier, safer. Floodlights 100-ft. area. Stormproof. Safety sealed fount can't spill fuel. Burns 20 hours for a dime. Ask your dealer for a demonstration.

FREE! Write for illustrated book telling about these and other Coleman Appliances. Address the nearest office.

THE COLEMAN COMPANY, Inc., Dept. 202-PS,
Wichita 1, Kans.; 401 N. Broad St., Philadelphia 8, Pa.;
Los Angeles 54, Calif.; Honolulu, T. H.; Toronto, Can.

Coleman

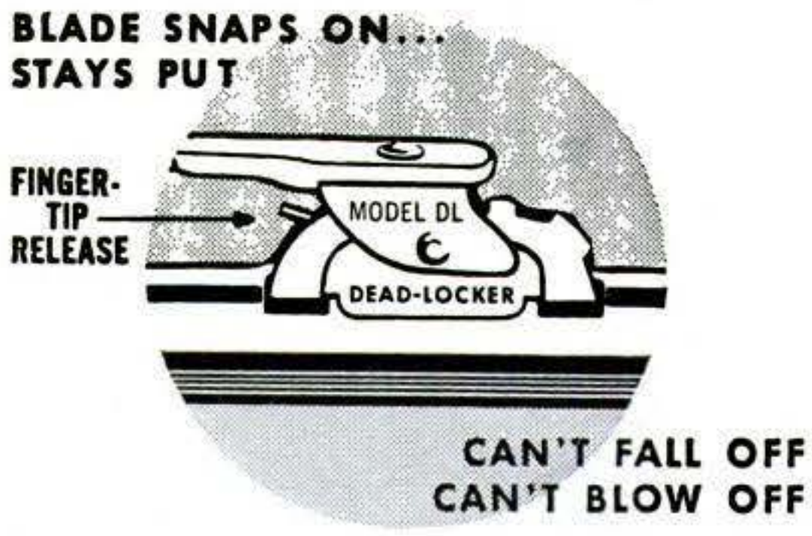
FLOODLIGHT LANTERN

Copyrighted material

ANCO RAIN-MASTER

"Dead-Locker"

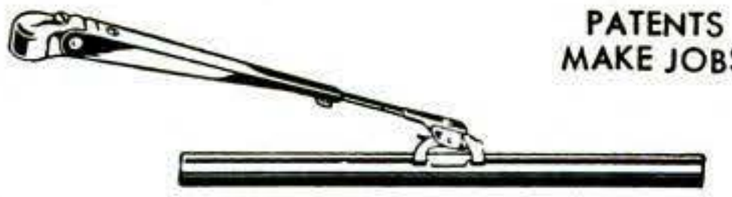
WINDSHIELD WIPER ARMS and BLADES



(A war-born invention—by ANCO—first for military aircraft—now for your car.)

DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!



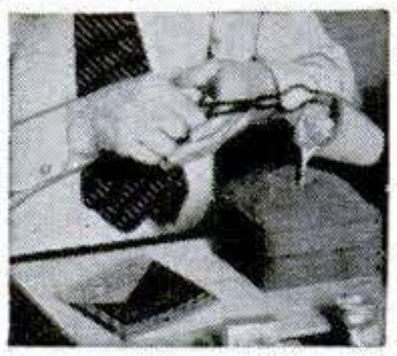
After all, it's *your* car to protect. So *you* remind *him*. Get RAIN-MASTERS ...patented features...original equipment on many makes of high grade cars and trucks . . . used in war—on our fighting tanks and trucks and ships and bombers too...because ANCO RAIN-MASTERS clean quicker, clean cleaner . . . last longer. May save you a costly smashup.

Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

THE ANDERSON COMPANY
Established 1918
GARY, INDIANA

Sand Casting—Forging—Heat Treating—Case Hardening

BRONZE FOUNDRY



is again available in limited quantity without priority. Orders filled in sequence as received. INVENTORS-SCHOOLS-CRAFTSMEN use FOUNDRYETTE for making castings quickly for new inventions, for instruction, and general purpose. Order now for early delivery. Three sizes are available capable of making bronze castings of 1½, 3, and 6 pounds weight, aluminum, copper, brass, etc. Domestic gas supply and 110 volt AC or DC energy required for operation. Write for circular.

KANSAS CITY SPECIALTIES CO.
Box 6022, Dept. S-79 **Kansas City, Mo.**

IF GLUE WILL FIX IT

FRANKLIN LIQUID HIDE **GLUE**

will do it better, faster, easier!

Ready-to-use Franklin makes joints stronger than the wood itself. Saves time — no mixing, no heating. Banish unpleasant odors, avoid chilled joints with Franklin Liquid Hide Glue.

The FRANKLIN GLUE CO., COLUMBUS 15, O

AT YOUR HARDWARE DEALER

Copyrighted material

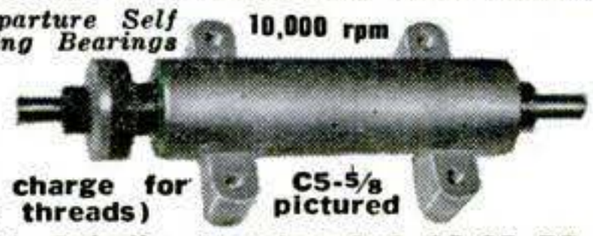
Keep Brushes like New

At Paint, Hardware, Dept., and 5 & 10c Stores

Patent Cereals Co. Geneva, N. Y.

Build Your Power Tools With OUR BALL BEARING ARBORS

New Departure Self Lubricating Bearings 10,000 rpm



(No extra charge for left hand threads) C5-5/8 pictured

B33—$4.95 PP
5/8x4 1/2 Spindle
B15 Plain Spindle
$3.45

C4-1/2x12 1/2 Spindle, Housing 2x8 $8.25 PP.
C5-5/8x12 1/2 spindle, housing 2x8 $8.25 PP.
C6-3/4x12 1/2 spindle, housing 2 1/4x8 $9.25 PP.
D8-1x17 1/2 spindle, housing 2 5/8x11 $16.95 PP.
1 INCH BETWEEN WASHER AND COLLAR

Shaper Arbors, C4, C6 or D8, 3 inches between collars, add $6.00. Plain Spindle Models less threads and collars C4—$8.00, C5—$8.00, C6—$9.00, D8—$16.00. All P.P. V Belts and Pulleys. Sanding Discs, 8"—$3.50 PP., 10"—$5.00 PP. Center Hole 1/2, 5/8 or 3/4, State hole size.

POLY PRODUCTS, 406 S. Chester, Ct. 1b, Pasadena 5, Calif.

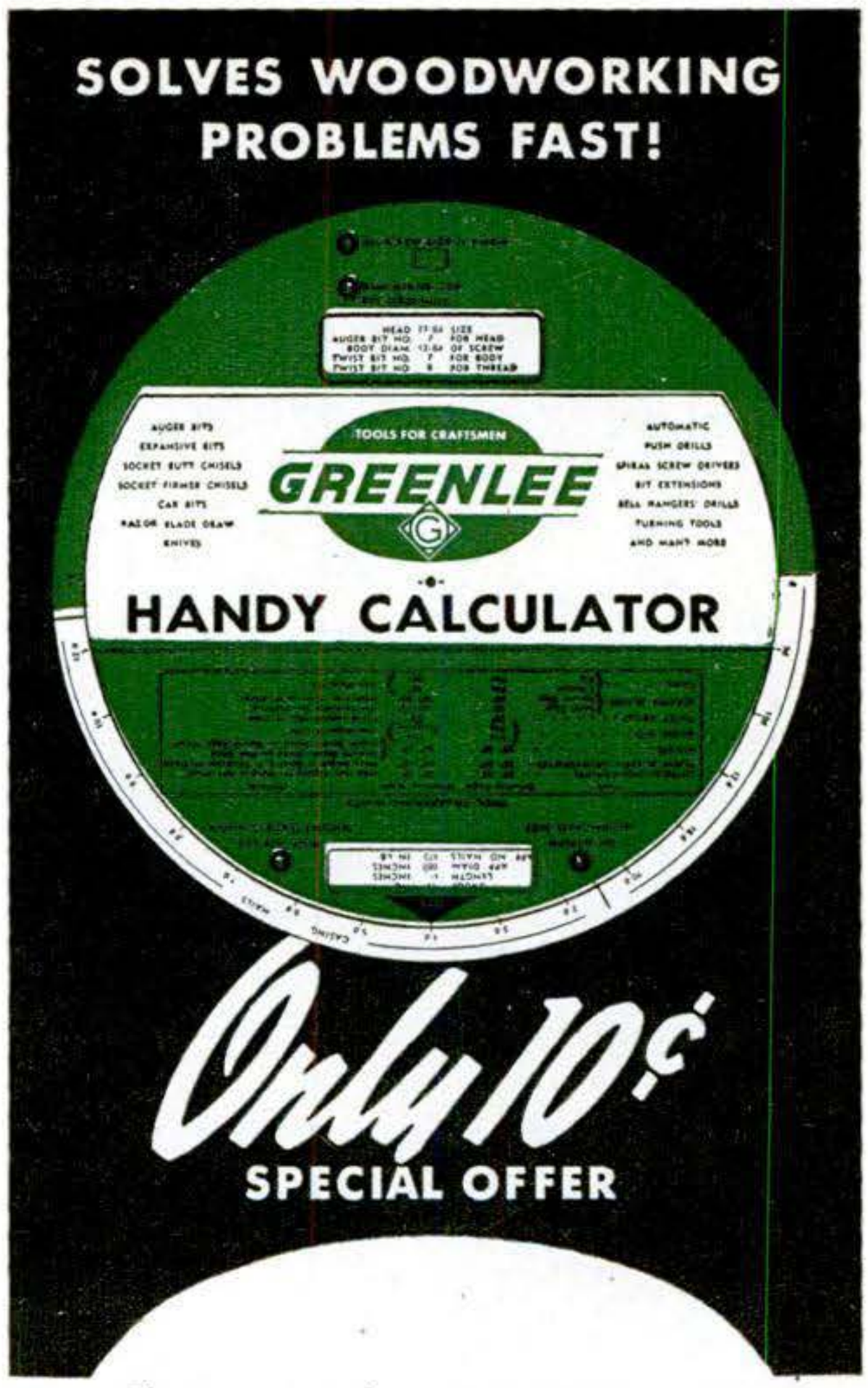
Say You Saw It In Popular Science

A Lifetime-Tool at Low Cost

The "YAGER" —Thickness Planer—not a jointer, for home-craftsmen, or auxiliary tool for large shops. A marvel of efficiency, precision performance —at an amazingly low cost. Dependable for constant, uninterrupted, trouble-free service. Works any stock from soft balsa to hard ebony. Produces smooth, polished surfaces. Takes stock up to 10 in. wide, 2 3/4 in. thick or down to a thinness of 1/16 in. Handles light work with 1/3 H. P. motor and hand crank feed or heavy cuts up to 1/8 in. with 3/4 H. P. Sealed ball bearing arbor requires no lubricant. Feed gears packed in oil seldom need repacking. Now ready for immediate delivery. Write for prices and startling facts.

THE KNEISLEY ELECTRIC COMPANY

495 S. St. Clair St. Dept. 67 Toledo 3, Ohio



• This easy-reading GREENLEE HANDY CALCULATOR swiftly solves your woodworking problems. Just set the dial: convert linear feet to board feet; get slope per foot in degrees; compare hardness, weights, shrinkage, warping and working ease of various woods. More, too: bit sizes for head, body, thread of screws; nail specifications; tool sharpening hints; protractor. 6" diameter, fits your tool kit. Heavily varnished cardboard. Special offer. Order now, send 10¢ (not stamps) in next mail. Greenlee Tool Co., 2126 Columbia Ave., Rockford, Ill.

TOOLS FOR CRAFTSMEN

GREENLEE

Copyrighted material

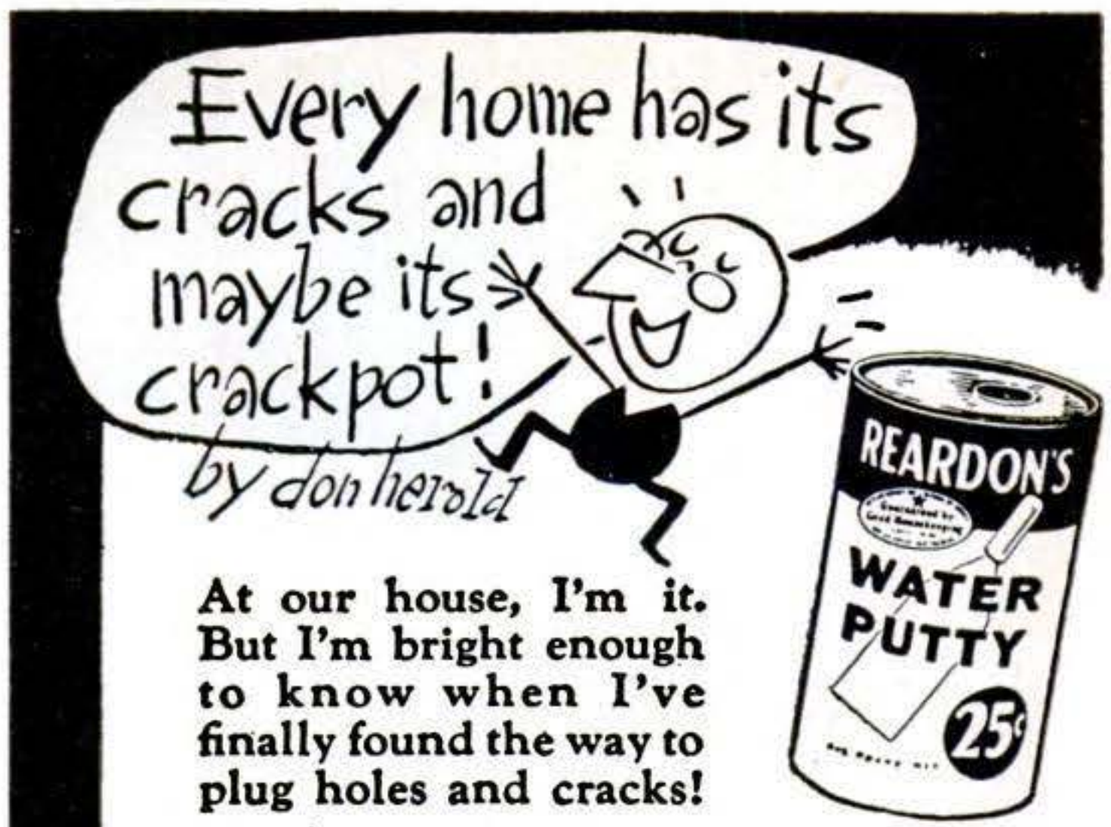
FOR NEW-CAR PEP, ECONOMY, SAY BURD "GRAF-FLOX" PISTON RINGS

• No, Burd doesn't advocate breaking speed-laws, but you don't have to confess that the old bus hasn't the pick-up she used to have. Install Burd "Graf-Flox" Piston Rings, and "hang onto your hat!" No kidding, the right Burd Combination Set in your engine will really work wonders . . . will give it surprising new power and snap . . . will cut fuel and oil bills. Yes, you'll get new-found pleasure in driving. Ask your service man about Burd Piston Rings . . . they are "Engineered for Results." Two free booklets, packed with handy information for the car-owner, are available *free*. Mail the coupon tonight!

BURD PISTON RING CO.
Dept. PS • Rockford, Ill.

THIS COUPON BRINGS FREE BOOKS

BURD PISTON RING CO., DEPT. PS
Rockford, Illinois
Gentlemen:
I'd like copies of your "Servicemen's Handy Handbook," which tells how to keep my car in good working order, and the booklet "No Job For A Dub."
Name.....
Address.....
City..... State.....



At our house, I'm it. But I'm bright enough to know when I've finally found the way to plug holes and cracks!

Just mix REARDON'S WATER PUTTY as you use it. No waste, no caking in the can. Dries hard and can be painted over. Will not shrink or loosen. Swell for reseating screws and repairing wood, metal, tile, plaster. Cent-sationally economical.

***Get a can at your hardware, paint, variety or department store.* 25¢ Lb. Can**

Made by The Reardon Co.
St. Louis - Montreal
Makers of BONDEX Cement Paint

Replacement or Refund of Money ★ Guaranteed by Good Housekeeping If Not As Advertised Therein

REARDON'S WATER PUTTY

Arc Welded Design "Know-How"

Only $3.50 each
3 different volumes
$10.00 postpaid

Each volume contains over 100 welding designs. Write
Hobart Bros. Co. Box P-561, Troy, O.

OTTAWA LOG SAW **Write For FREE BOOK**

Put this OTTAWA to work for you. MAKE MONEY! Wood is bringing highest prices ever known. Ottawa does more than 10 men. Easily operated. Falls trees—saws limbs. Use 5-hp. engine for other work.

OTTAWA MFG. CO., 601 Wood St., Ottawa, Kans.

HOLD-E-ZEE

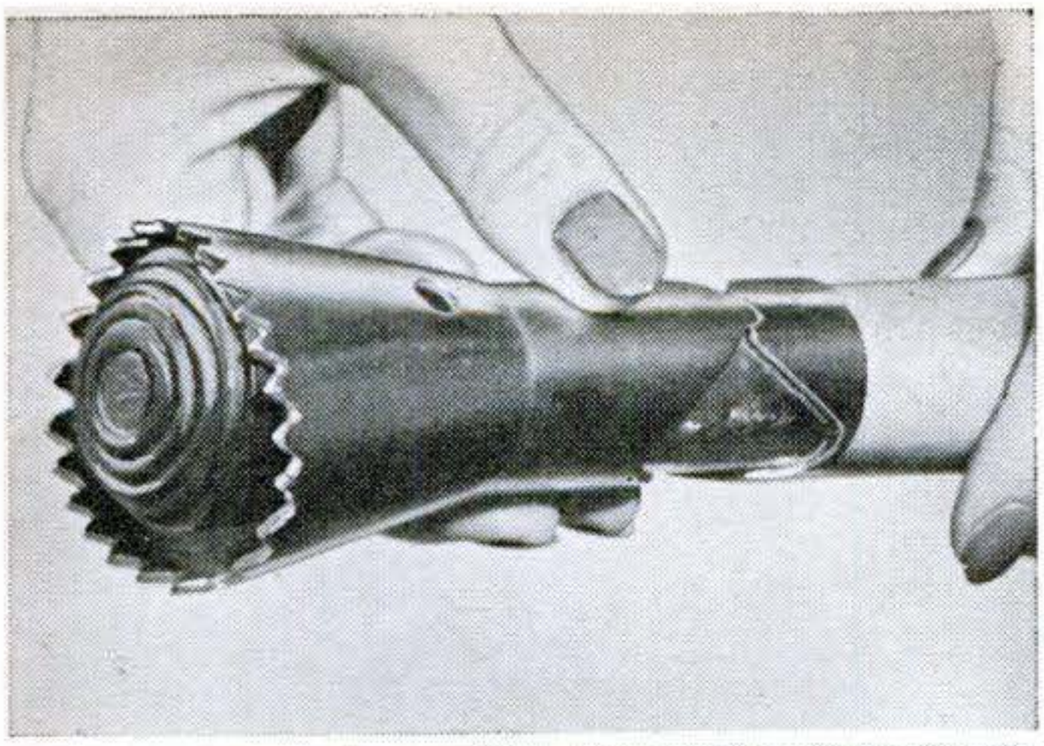
AUTOMATIC GRIP
SCREW-DRIVERS

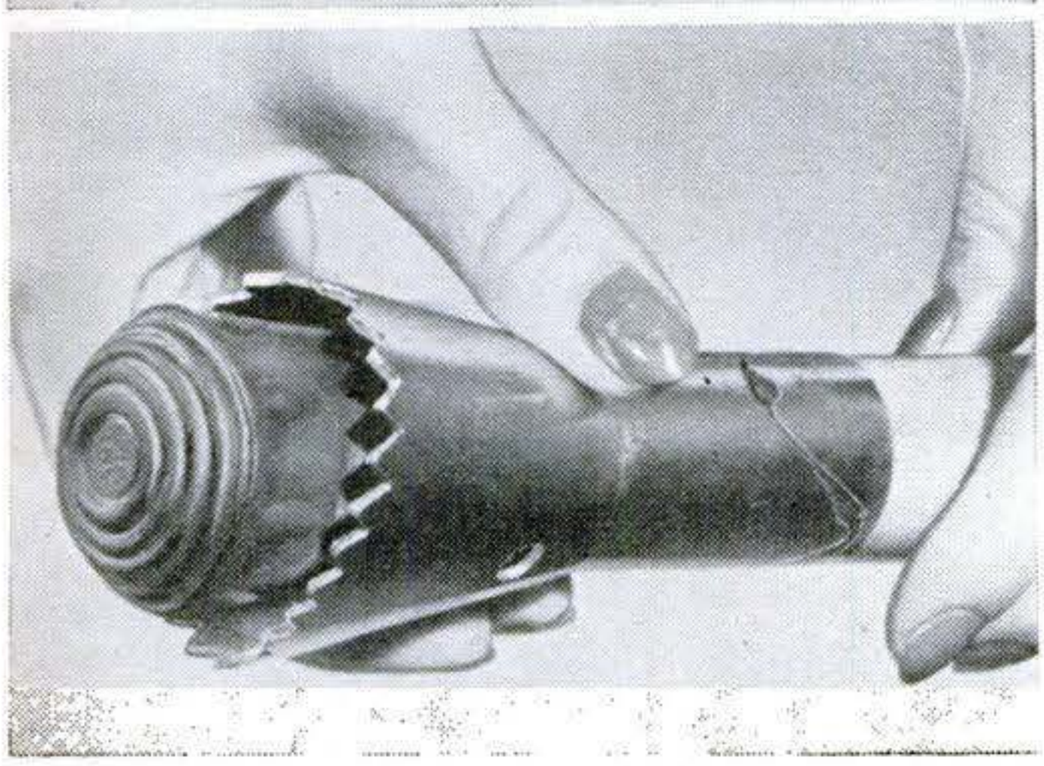
UNSURPASSED QUALITY
Plus the
EXCLUSIVE GRIPPER

Gripper slides up out of way when not in use. Insulating handles. Complete range of sizes.
AT LEADING DEALERS EVERYWHERE

UPSON BROS., INC., 86 EXCHANGE ST., ROCHESTER 4, N. Y.

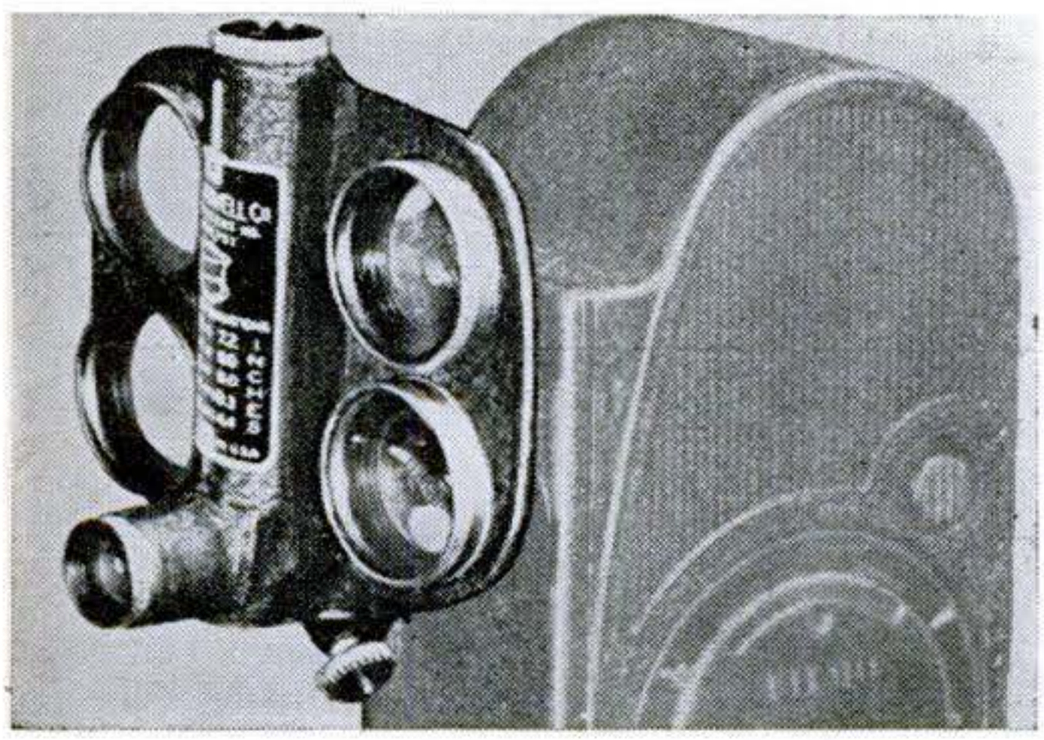
Copyrighted material





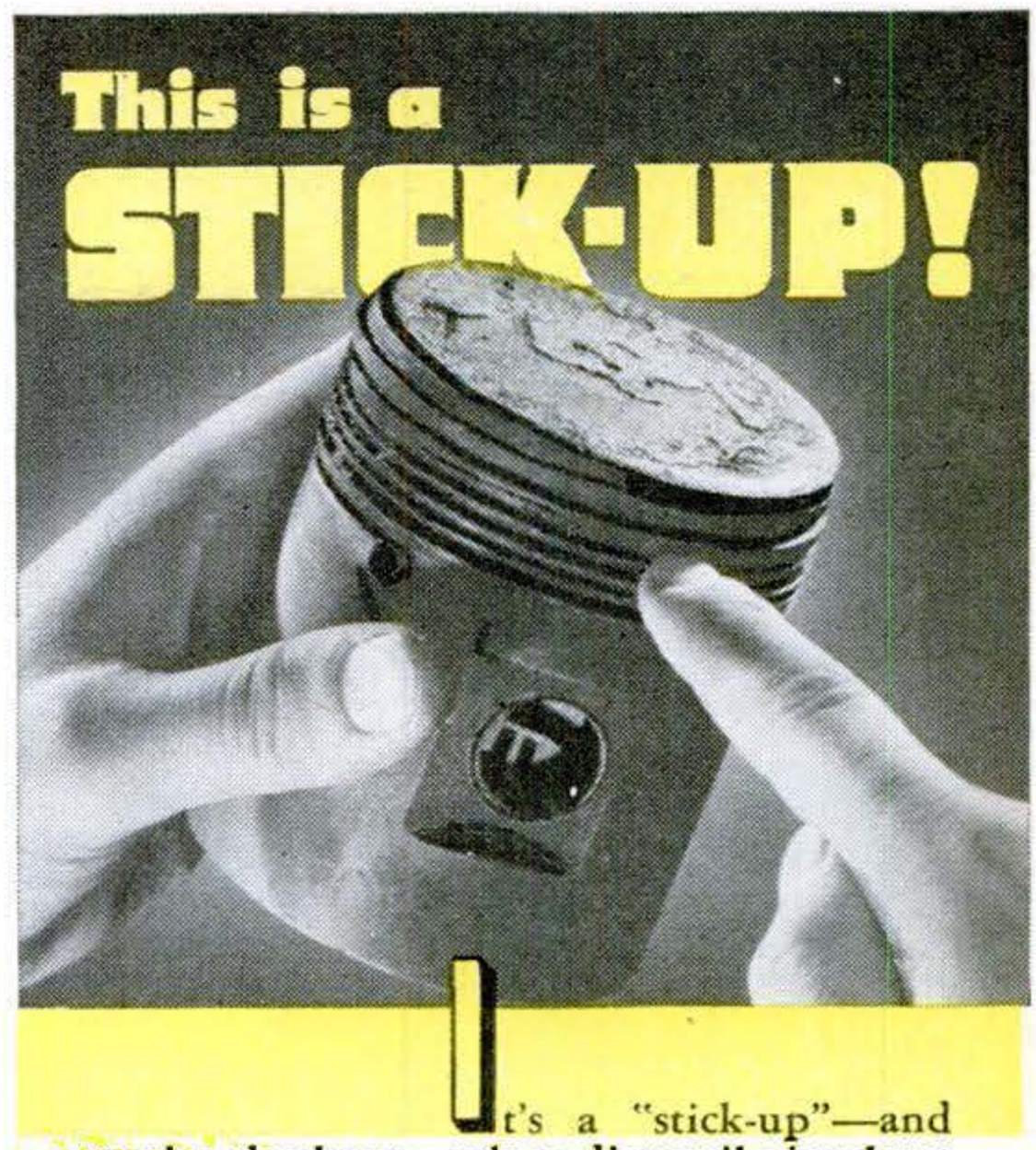
Steel Tip Steadies Crutch

DESIGNED to grip firmly on packed snow, wet pavements and other slippery surfaces, a steel safety tip for crutches is easily attached. A quarter turn adjusts it for use or retracts it. Peck Industries, of Cleveland, makes the device.



Camera Fixture Takes Close-ups

SHARP focusing at ranges as close as six inches is possible with a Bell & Howell attachment for users of Filmo eight- and 16-mm. movie cameras. An auxiliary lens with compensating view finder comes with the new unit.



It's a "stick-up"—and you're the loser—when dirty oil circulates through your engine. Have your oil tested —*free*—by the AC method. If your oil contains grit, dirt or carbon, it stands out clearly on the clean white AC Test Pad.

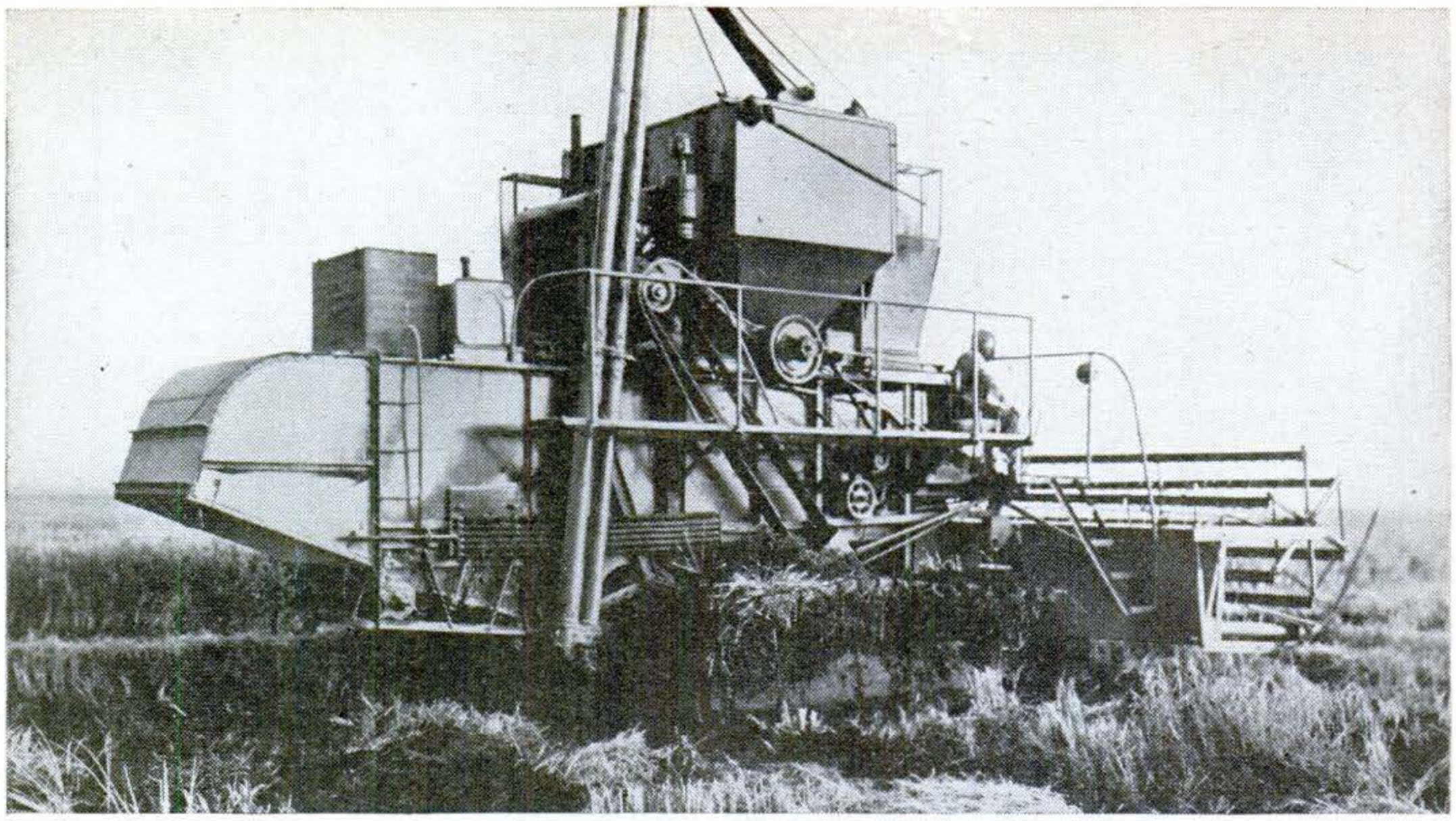
Dirty oil clogs piston rings and slots—makes valves stick—wears out moving parts—wastes fuel and oil—robs engines of power.

You can prevent that "highway robbery" by installing an AC Oil Filter or Element. Why not do it today?

Free oil tests with AC Test Pads, as well as AC Oil Filters and Elements, are available at any AC Oil Filter Service Station.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

Copyrighted material



Harvester Works in Wet Fields

RAIN-DRENCHED fields need not delay the farmer during harvest time if he uses the tractorlike combination harvester and thresher built by the Heidrick Brothers, one of the largest rice growers in California. Designed mainly for rice-field operation, the machine can also be used in reaping wheat and barley. It is powered by two General Motors three-cylinder, 65-hp. Diesel engines —one for the propelling and harvesting mechanisms, the other for the thresher—providing a fuel saving over older machines.

When you look for quality features in an outboard motor, look for them in the line where they were originated, developed and *perfected.*

These are outboard motoring's big features. All are *Johnson* developments.

- Alternate Firing
- Full Pivot Reverse
- Dual Carburetion
- Rewind Starter
- Rotary Valve
- Shock Absorber Drive

—and Others!

FREE HANDY CHART

Write for Sea-Horse Handy Chart of motor sizes and specifications. 5 great models. Consult your Johnson dealer about delivery. Look for his name under "Outboard Motors" in your classified phone book.

JOHNSON MOTORS, 500 Pershing Road, Waukegan, Ill.

Johnson Motors of Canada, Peterboro, Canada

JOHNSON SEA-HORSES FOR DEPENDABILITY

Copyrighted material

MODEL 36 CARBINE, with full magazine of 7 shots and 20" barrel, is ideal for fast shooting in brush and from horseback $55.60*

MODEL 36 SPORTING CARBINE—6 shots, 20" barrel—has the balance and feel of a longer rifle, yet handles fast in thick cover. $55.60*

MODEL 36-A RIFLE—6 shots, 24" barrel—is preferred in open country and on long shots. With telescope sight, gives high accuracy at long range. $65.50*

• Here's a tip if you plan to buy a Marlin Model 36 Rifle this year: *give your dealer the order now.* It takes time and skilled manpower to turn out fine sporting guns. 1947 production, while increased, will not last long. We suggest you order now—to be sure of your Marlin 36 for the Fall hunting season. It will give you a lifetime of sport.

OUTSTANDING FEATURES OF MARLIN 36 RIFLES:

Rugged construction; dependability; accuracy; long life. Solid top, non-glare receiver, allowing *low* telescope mounting; drilled and tapped for Lyman 56 and other receiver sights as well as tang peep sight. Powerful extraction of shells, ejection at the *side* for safety—deep-cut, Ballard type rifling—fast lever action—tapered barrel of special smokeless steel—unbreakable coil and trigger springs—selected American walnut stock and forearm. All Marlin High-Power Rifles are targeted and proof tested (JM) before shipment.

Marlin 36

Famous High-Power Rifles 30/30 and .32 Special Calibers

***Prices slightly higher west of the Rockies.*

THE MARLIN FIREARMS CO., NEW HAVEN, CONN. • *Fine Guns Since 1870*

Copyrighted material

SMASHING PRICE CUT ON THE HUDSON TURBO GRINDER

Here is one of the most sensational price reductions you've ever read. The Hudson Turbo Grinder is now reduced in price to only $4.95. The Hudson Turbo Grinder was a great value at $8.95. Now it's a twice-as-good value at $4.95.

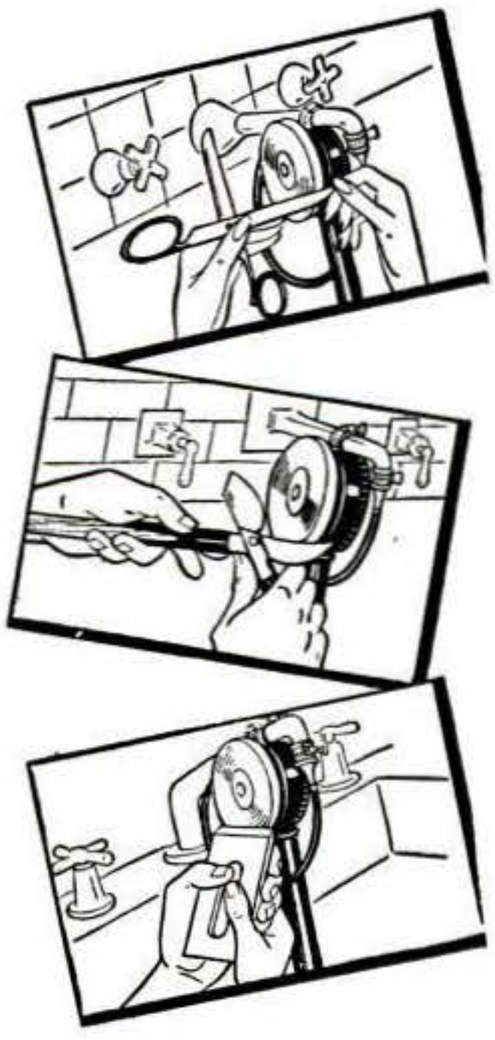
HERE'S WHY WE'RE REDUCING THE PRICE

This amazing Hudson Turbo Grinder has caught on. Thousands have ordered it and the tremendous volume of orders has permitted us to set up large quantity production runs at substantial price savings. **Now everyone who works with tools can afford to own a Hudson Turbo Grinder.**

The Hudson Turbo Grinder is a top quality product—super-hard silicon carbide grinding wheel, stainless steel shaft, oilite bearings, gleaming chrome housing, colorful vinylite tubing.

Simple to operate—just attach to your faucet, turn on the water and the Hudson Turbo Grinder spins at 3000 to 10,000 RPM depending on water pressure.

Sharpens knives, scissors, wood planes, chisels and all edged tools. Buffs and polishes silverware and metals. If you are a handyman, hobbyist, housewife, or mechanic, if you want sharp tools, join the thousands who are now getting sharp edges, quickly and easily, with the Hudson Turbo Grinder.



FULL MONEY BACK GUARANTEE

Available thru any progressive dealer, or send money direct.

THE HUDSON PRODUCTS CO., Inc.

4400 St. Aubin Ave. Room 226 Detroit 7, Mich.

ELECTROPLATING OUTFIT

Comes Ready to Use—Nothing Else to Buy!

Here's the Handy ELECTRO-PLATER outfit for your home-workshop or business! **Only $3.95 complete!** Puts a smooth, shining, silver or copper plating on silverware, toys, models, doorknobs, auto accessories, home fixtures . . . everything with a conductive surface! Simple, easy to use! Complete instructions furnished. Just **brush on** silver or copper plating! Comes complete—ready to use—with liberal jars of silver and copper plating materials, cleaner, two brushes, battery power unit . . . everything you need to start plating at once! Nothing else to buy.

SEND NO MONEY! GUARANTEED!

Rush order today—a postcard will do. Electro-Plater shipped direct to you by express. Pay only $3.95, plus express charges, on delivery—or send $4.60 with order and we ship prepaid. Use 10 days, if not completely satisfied, return outfit and your money will be refunded. Order now.

HANDY ELECTRO-PLATER • Dept. B-414
259 Strader Avenue Cincinnati 26, Ohio

BUILD YOUR OWN MACHINE TOOLS!

Blueprints $1.00-Catalog FREE

Detail construction Blueprints on 6 Lewis metal and wood-working tools postpaid for $1.00. Includes prints for Lewis 10" Shaper, Milling Machine, Drill Press, Vise, 8" Circular Saw, 6" Jointer. Castings for these tools save up to 80% of comparable new tool cost.

Illustrated 32-page Catalog—sent free with Blueprint Order —describes 21 Lewis tools. WRITE TODAY!

LEWIS MACHINE TOOL CO.
P. O. Box 7446, Sta. L, Dept. S, Los Angeles 23, Calif.

WOOD WORKERS

Lumber—Plywood Available

Harold Hunt wants to send you big new No. 15 Catalog. Over 148 pages of woodworking ideas. 12 pages of rare woods in colors. UNEQUALED BARGAINS in imported and American woods, supplies, hard-to-find hardware. Send only 15c to cover postage and handling.

CRAFTSMAN WOOD SERVICE CO.
2729 S. Mary St., Dept. B-82 Chicago 8, Ill.

NEW TOOL READY!

QUICKLY SHAPES, SANDS, CARVES, PROFILES, GRINDS, BEVELS, SMOOTHS, POLISHES, CLEANS!

Industry's most versatile machine, **The Mead Bandsander—now available** to hobbyists, craftsmen, model makers, pattern makers, home workshops—cuts fast and clean on wood, metal, plastics! Works equally well on **inside** cut-out openings or irregular outside edges, on intricate scrolls, curves, saves hours of tiresome hand work—does better job. Nothing else like it. IDEAL TO GIVE OR GET FOR WORKSHOP! Sold on 5 Days' Trial, money back GUARANTEE.

Bandsander

FREE!

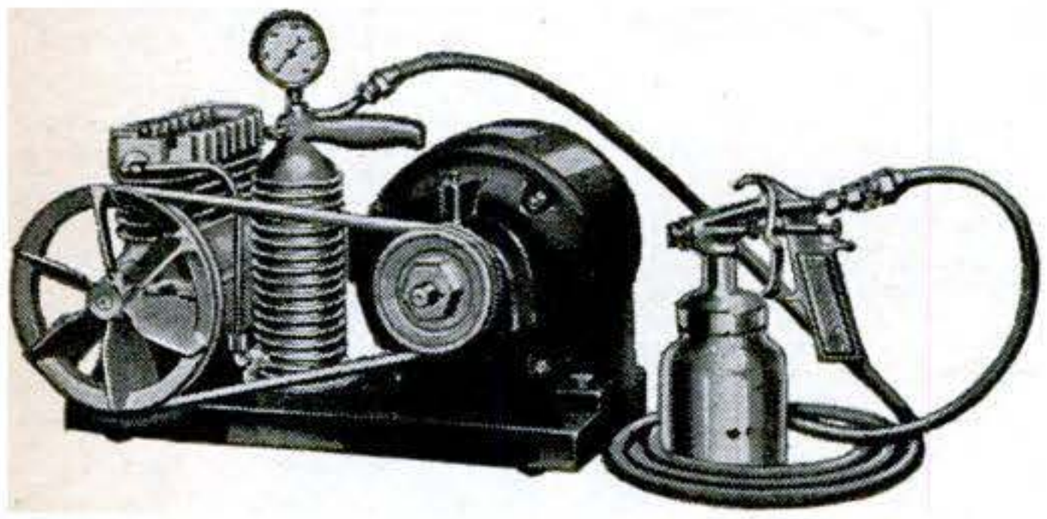
Write for free, lavishly illustrated Circular describing how Bandsander—the machine that amazed the experts — saves time, money, trouble. Write now—a post card will do!

MEAD SPECIALTIES CO.
4114 North Knox Ave., Dept. 267, Chicago 41, Ill.

Copyrighted material

PRESSURE QUEEN

FOUR CYLINDER
PORTABLE AIR COMPRESSOR
SPRAY PAINTING OUTFIT



COMPACT • RUGGED • POWERFUL

The ideal air supply for home and farm workshop, machine shop, garage and contracting painter; for product finishing, inflating tires, painting automobiles, trucks, machinery, etc. Indispensable for building maintenance, interior and exterior. Handles any paint, insecticide or disinfectant.

This *4 cylinder compressor* has drop forged crankshaft, stainless steel, heat treated valves; bronze bearings and positive forced feed lubrication. Maximum pressure 50-60 lbs., free from pulsation. Standard equipment includes the compressor mounted on steel base with carrying handle, belt, compressor pulley, air chamber, air gauge, 15-ft. hose, spray gun. Requires ½ or ⅓ h.p. motor or gas engine.

If your dealer does not sell Pressure Queen write direct

THE CAMPBELL-HAUSFELD CO.
151 RAILROAD AVE., HARRISON, OHIO

$2.95

TORNADO
GAS TORCH

The Modern Way of Soldering

Ideal for hard and soft soldering. Will heat quickly; solder will flow freely and smoothly. No compressed air required. Nothing to pump. Self-adjusting. Safe. Economical. Can be used for annealing small parts and bending metal parts. Generates a heat of 1700° Fahrenheit. Simply connect to any illuminating (manufactured) gas jet with a rubber hose and operate. Tornado Torch No. 119 comes with three (3) tips, (1/8", 1/4", 3/8" blast).

The Tornado Gas Torch No. 119, complete with three tips, is $2.95. See your dealer or order direct. Send check or money-order—post paid.

Robco Corporation, 204 E. 44th Street, New York 17, N. Y.

75 MILES Per Gallon

Cushman MOTOR SCOOTER

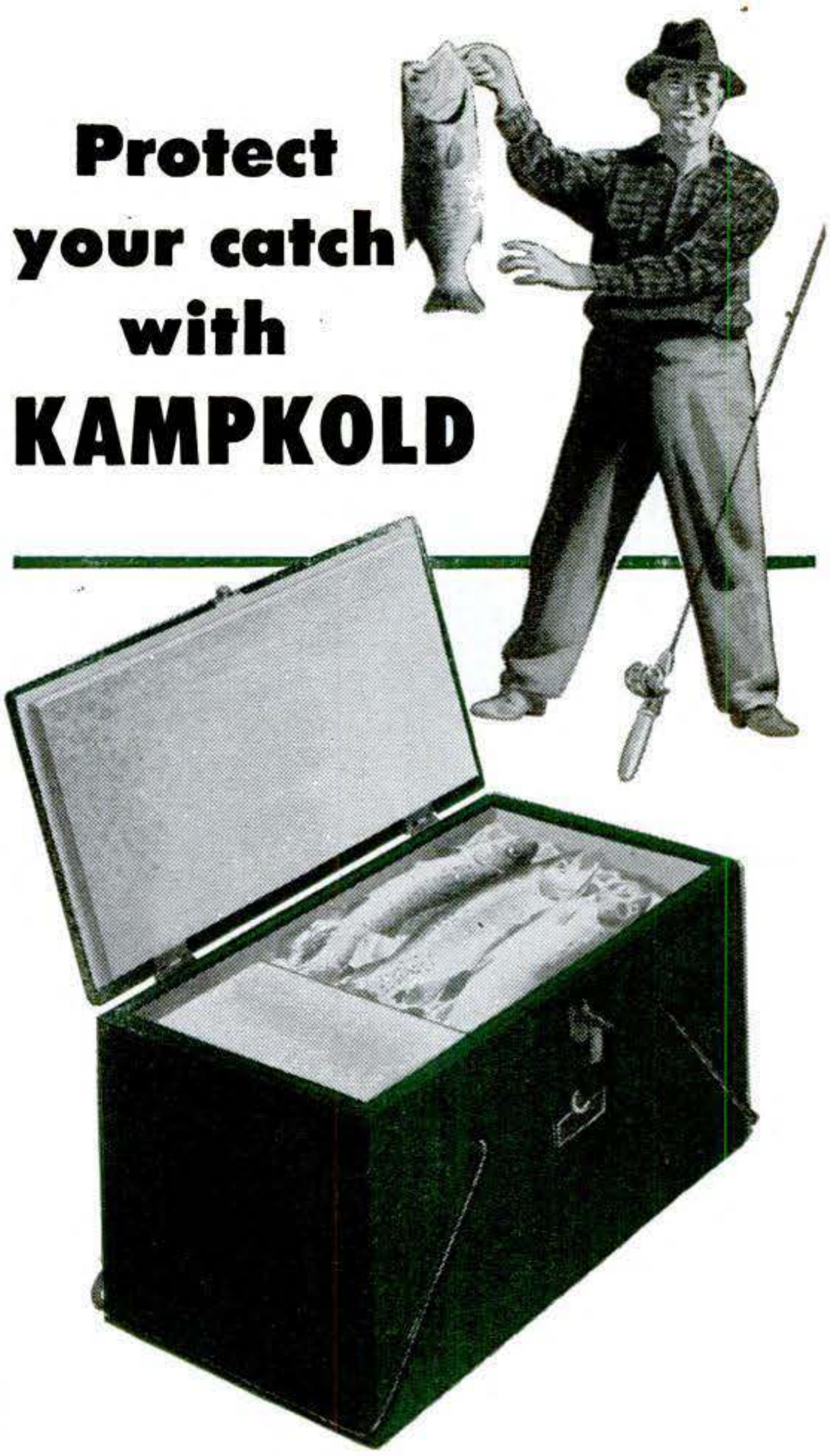
The two wheel Cushman Motor Scooter, when equipped with tandem seat, will safely and comfortably carry two people. When equipped with SIDE KAR a third person or a 200 lb. payload can also be carried. Side Kar quickly and easily detachable.

For City or Highway—factory, farm or commercial use!

DEALERS from Coast to Coast. Write today for name of your dealer and ***FREE*** FOLDER describing our two and three wheel models.

CUSHMAN MOTOR WORKS, INC., Dept. S-600, Lincoln, Nebr.

Protect your catch with KAMPKOLD



KAMPKOLD is needed by every sportsman—to take lunches, cool drinks *on* fishing trips and to keep fish in good condition on the way *back!* It refrigerates like a home icebox—container keeps ice from sides and bottom. Thoroughly insulated! Ten pounds of ice lasts twenty hours in 80 degree outside temperature.

Sturdy 26 gauge steel—10¾ x 22 x 10 inches high; strong bail type handles.

KAMPKOOK • • •

For 34 years the sportsman's camp stove. Burns filling station gasoline. Two burners! Folds up like a suitcase—only 11 inches by 17 inches by 4¾ inches.

• • • READY-LITE

Backed by fifty years of lantern experience. One or two-mantle models. Eight to ten hour steady white light on one filling.

PRODUCTS OF

AMERICAN GAS MACHINE COMPANY
Albert Lea, Minnesota

"Equipment Most Sportsmen Like Best"

AGM

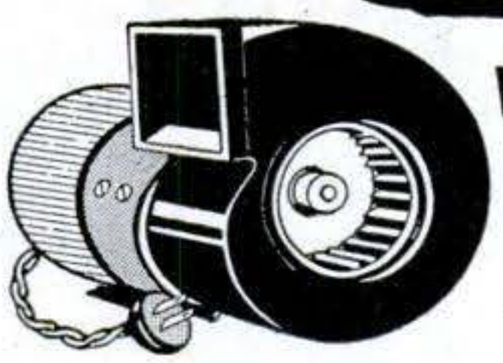
Copyrighted material

WESTON
EXPOSURE METER

Colors will be true and life-like if your exposure is correct. That's why photographers everywhere rely on the WESTON Exposure Meter. Ask your dealer for a demonstration today. Weston Electrical Instrument Corporation, 622 Frelinghuysen Ave., Newark 5, N. J.

The meter most photographers use!

EXHAUST BLOWERS



$15.85

WORTH $50

For PHOTOGRAPHERS • HOSPITALS • LABORATORIES • WORK SHOPS • LAUNDRIES • OFFICES • RESTAURANTS • PRINTERS • PLAYROOMS

100 CU. FEET FRESH AIR EVERY MINUTE!

Solve your ventilation problems with this NEW durable, built-for-service blower and exhaust. Quick and simple to install. Anyone can do it with ordinary household tools.

110 Volt, A.C., 50-60 cycles. Continuous duty. BALL BEARING motor assures quiet, trouble free operation. Rugged housing insures long life.

Send Check, Money Order. No C.O.D.'s. West of Mississippi add $1.00 for mailing, handling.

Immediate Delivery!

UNIVERSAL YONKERS CORP.,
(Dept. S-6) 41 Locust St. Yonkers 2, N. Y.

PLEXIGLAS

New Low Prices, new masked prime stock, clear

Thicknesses, per square foot; 1/16" @ $1.00; 1/8" @ $1.30; 3/16" @ $1.60; 1/4" @ $1.85; 3/8" @ $2.75; 1/2" @ $3.60; 3/4" @ $5.50; 1" @ $7.40. Sheet sizes 6" x 12"; 6" x 24"; 12" x 12"; 12" x 24" & 12" x 36". Add 10% for packing and postage any place U.S.A. Minimum order $5.00. Send Money Order for prompt shipment.

PLASTIC SUPPLY CO., Dept. PS-60, 2618 St. Louis Ave., St. Louis 6, Mo.

WORK BENCH

$16.95

Ideal for hobbyist or shop worker, this sturdy, useful bench makes home handiwork a joy! Heavy top, 2 large drawers. Tool rack, strong shelf, bins for nails and bolts. 59" long—23" wide—36" high. Shipped unassembled, easily set up (from instructions). F.O.B. Phila. factory. Check or money order. Money back if not satisfied.

QUALITY CRAFTSMEN, INC., Dept. S, 3431 Market St., Philadelphia 4, Pa.

LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 38 years expert instruction—over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 78-S, 646 N. Michigan Ave., Chicago 11, Ill.

BRASS

For Home Work Shops

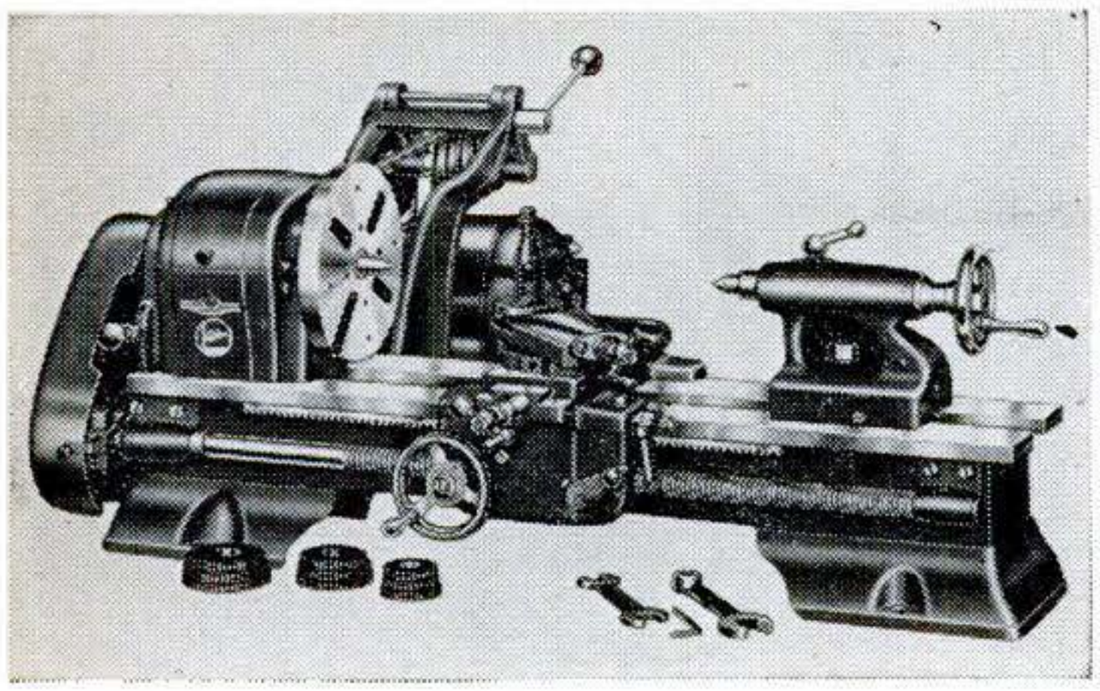
Free Cutting Brass Rods
Round, Hex, Sq., ½-Oval
Naval Brass Rods
Round and Hexagon
Brass and Copper Tubing
Brass Sheet

Please Send 10c for Catalog 102

MEIER BRASS & COPPER CO.
1155 Bellevue, Detroit 7, Mich.

Copyrighted material

Now Available for YOUR SHOP!



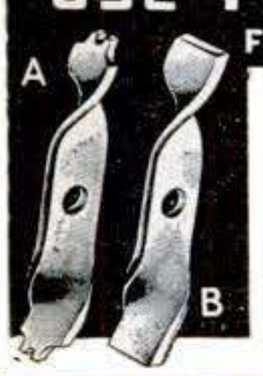
Atlas 6" LATHES

Now you can begin to equip your shop for precision metal craftsmanship. Once again these capable low-priced lathes are ready for your inspection at Atlas distributors. The Atlas gives you 16 speeds, cuts 8 to 96 threads per inch, has Timken-equipped backgeared headstock, V-belt drive, reversible automatic longitudinal power feed. Operates from 1/3 H.P. 1725 RPM motor. See it at your Atlas distributors or send for descriptive catalog. Price, less motor, F.O.B. Kalamazoo, complete as shown **$115.**

ATLAS PRESS COMPANY
655 N. Pitcher St. Kalamazoo 13, Mich.

LATHES • DRILL PRESSES • SHAPERS • MILLING MACHINES

USE YOUR BENCH SAW
FOR JOINTING & CUTTING MOULDINGS



With our six inch tool steel cutters make mouldings, casings, drop-leaf tables, grooves beading and jointing. Moulding cutters, A 1 in. wide $1.50. 1½ in. $2.00. Jointing cutters, B 1 in. $1.50. 1½ in. $2.00. E 1 in. for drop-leaf tables, $1.50. E 1½ in. Makes ¾ in. cove & Quarter. $2.00. Postpaid. Guaranteed. State size hole. List & Folder free.

JOHN A. SANDSTROM
Rt. 1-P. Clearwater, Fla.

ATTENTION HOMECRAFTSMEN!

PLANS For Dutch Windmills, Lighthouses, Bird Houses, Lawn Chairs, Arbors, Trellises, many kinds of fine furniture, also a great variety of Lawn Figure patterns.
SEND 10c FOR CATALOG ILLUSTRATING OVER 100 PRACTICAL PROJECTS
Craftsman's Model Co., 2030 N. 41st St., Dept. K18, Milwaukee, Wis.

NOW 93% MORE ENERGY, LONGER LIFE

Get the New "Eveready" Flashlight Batteries

The word "Eveready" is a registered trade-mark of National Carbon Co., Inc.

Cut NEW TEETH in 3 Min.
With FOLEY RETOOTHER

For All HAND SAWS

No need to grind off old teeth — cut new ones over them. Fast, accurate, no eyestrain. Cuts filing time in half.

Cuts 20 sizes of teeth from 4 to 16 points per inch. Immediate delivery

FOLEY MFG. CO. 691-7 Foley Bldg., Minneapolis 13, Minn.
Send full details on Foley Retoother.
Name.....
Address.....

VACATION TOURS
TOPS FOR FUN
When you own a
HARLEY-DAVIDSON

Visit your country's historic places, natural wonders and famous fun spots the Harley-Davidson way! Go anytime — stop where and when you please — no timetables to follow. Your Harley-Davidson turns every evening, holiday and weekend into *extra vacation time* — as you join other riders on pleasure trips. Take in gypsy tours, race meets, hillclimbs and other thrill-packed motorcycling events. See your Harley-Davidson dealer NOW — and mail coupon today!

HARLEY-DAVIDSON *Motorcycles*

Harley-Davidson Motor Co., Dept. PS, Milwaukee 1, Wis.
Please send at once free copy of 24-page "ENTHUSIAST" Magazine, filled with thrilling motorcycle action pictures and stories.
Name.....
Address.....
City.....State.....

Copyrighted material

"I have maintained that America needs a fine light car--Crosley sales prove I was right!"

Powel Crosley Jr.

PRESIDENT, CROSLEY MOTORS, Inc.

Consider what you get in a new fine CROSLEY—a really modern-looking fine car with ample room for 4 six-footers, plus baggage. Lightning pick-up, "parks on a dime", big-car comfort, amazing driving ease. And a 4-cylinder, valve-in-head steel engine that weighs less than 150 lbs., yet delivers speeds up to 60-plus! This CROSLEY COBRA (COpper BRAzed) is the most talked-of internal combustion engine in 40 years; gives 35-50 miles per gallon on ordinary gasoline! If genuine economy means anything, you should drive the new fine CROSLEY before you buy any car!

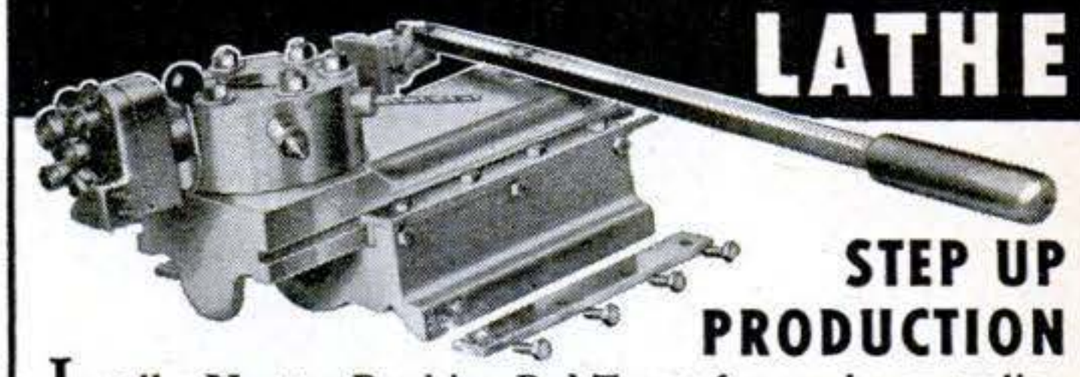
CHECK THESE FEATURES! ALL STEEL construction. low center of gravity means greater safety. MODERN Streamlining, the "aircraft flavor." WEIGHS only 1150 lbs., curbside, perfectly balanced, weight-to-power; instant pick-up; oversize shock absorbers.

For information and literature write:
Crosley Motors, 2532-JA Spring Grove Av., Cin'ti 14, O.

GET INTO BUSINESS WITH SMALL CAPITAL working at home or shop. There is big money making HOLLYWOOD STYLE cement pottery, birdbaths and garden ornaments without moulds. Also imitation marble, water-paints, chemical staining, etc. 10c brings sample, details and pictures.

HOLLYWOOD CEMENTCRAFT
8527-B Wonderland Ave., Hollywood 46, Calif.

MORE PROFITS FROM YOUR LATHE



STEP UP PRODUCTION

Install a Newton Precision Bed Turret for maximum tooling on your Logan, Atlas or Craftsman Lathe. This self-indexing, self-headlocking turret accommodates six tool positions. Has hand-scraped ways. Adjustable gibs assure long-life and precision operation. Fast—smooth—easy to operate. Get greater production now. Write for information today!

A. K. TOOL CO., 2029 Blake Ave., Los Angeles 26, Calif.

Extra! JUST OUT Extra!

INSTANT NICKEL

NO CURRENT OR BATTERIES USED

U. S. PAT. PEND. NO. 702581

COMPLETE $2.00 POST PAID COVERS 10 FT. AGENTS WANTED

Iron, Steel, Aluminum, Brass, Bronze, Copper and practically all Industrial Metals can now be HEAVILY nickel-plated WITHOUT equipment, vessels, electricity or previous copper plating, a blessing to Hobbyists, Doctors, Hospitals, Restaurants, Bar and Beauty shop owners. Recommended for Auto, Bicycle and Machinery parts and accessories, Musical Instruments, Electrical appliances, Coffee Urns, and practically anything made of metal.

IN THIS MARVELOUS NEW PROCESS the principles of the battery and electroplating have been harnessed in the INSTANT NICKEL formula, so when it is applied with a wet applicator on a clean metallic object, a bright nickelplate instantly appears! Thickness of plating is regulated by number of applications.

JUMBO SHOP SIZE (nickelplates 50 sq. ft.) only $6.75 postpaid. Sample offer $2.00 postpaid. Applicator sent free. Send check or money order today! C.O.D's few Cts. extra for Postage.

INSTANT PLATING PRODUCTS, 3439 Michigan Ave., Chicago 16, Ill.

FREE! FAMOUS BLUE BOOK CATALOG

GAME SUPPLIES

Club Furniture - Counter Games - Punchboards - Magic Cards Readers, Read the backs - Inks - Daubs - Poker Chips - Tops Flats - Layouts - Game Boxes.

K.C. CARD CO., 838 South Wabash Ave., Chicago 5, Ill.

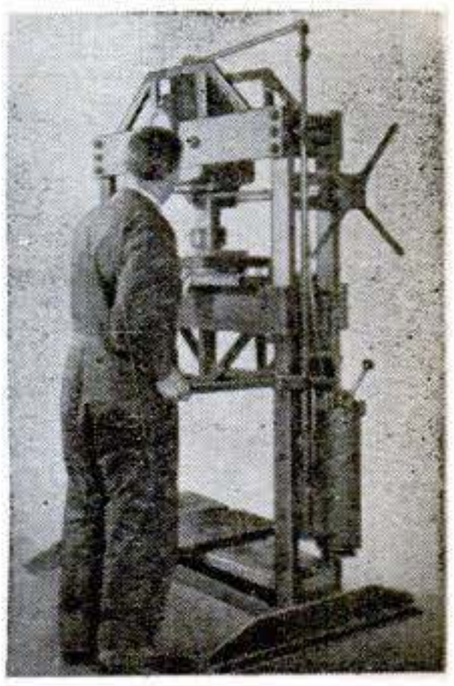
RUBBER MOLDS! Make your own rubber molds! Cost only a few cents each! Cast plaques, novelties, bookends, lamps, clock cases, ash trays, etc. We supply everything! Also make pottery, vases, window-boxes, sundials, bird baths, garden furniture. Send a post card for FREE SAMPLE!

H. Tooker, 630 E. Chestnut St., Hamilton, Ohio.

WRITE FOR YOUR FREE COPY OF THE NEW KRW HYDRAULIC PRESS BOOK

Describes all manner of Production and Shop Work on KRW Hydraulic and Bench Type Arbor Presses. 32 pages illustrating the new KRW Hand-operated, Electric-operated and Air-operated Hydraulic Presses.

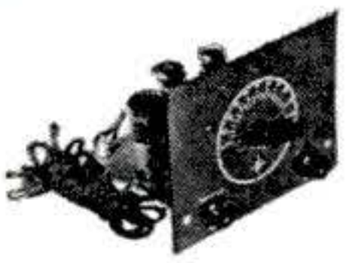
Write for your copy today.



K. R. WILSON, DEPT. 54, 215 MAIN ST., BUFFALO 3, N. Y.

Copyrighted material

BUILD YOUR OWN RADIO



3-TUBE AC-DC KIT

It's great fun to build and hear this fine 3 tube set. Gets all stations from 550 to 1500 kc. For 110 volts AC or DC. Uses 2—6J5 and 1—6SJ7 Tubes. Complete kit, less tubes, wire, solder, and phones, only **$6.15**

Kit of 3 Tubes.....$2.40 — Set of Phones.....$1.95

5-TUBE AC-DC MODEL

A full-sized 5 Tube SuperHet Kit with Automatic Volume Control, Built-In Antenna, PM Dynamic Speaker, Brown Plastic Cabinet. Uses 12SA7, 12SK7, 12SQ7, 50L6, 35Z5 Tubes. For 110 volt AC or DC. Complete, less tubes..... **$12.75**

Complete Kit of Tubes (as above).....$4.08

PHONO Oscillator

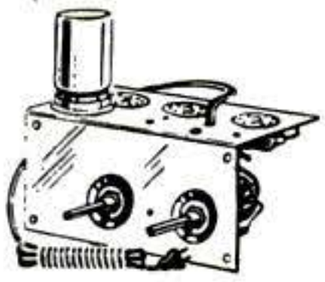
2-Tube Kit

Build this fine Phono Oscillator with complete kit and instructions. Mounts anywhere. 110 volts AC or DC. Including two tubes Only..... **$5.33**

Order from New York or Chicago

Enclose postage with order

PHONO AMPLIFIER



2-Tube Model Compact, mts. any position. Tone, volume controls. 35Z5, 50L6. 110 V. AC-DC. Wired, ready to operate, less tubes..... **$2.95**

2 tubes for above.....**$1.62**

3-Tube Model — Similar, uses 35Z5, 12SK7, 50L6. Less tubes **$4.45**

3 Tubes for above.....**$2.54**

NEW YORK
Offices & Warehouse
242 W. 55th St., N.Y. 19

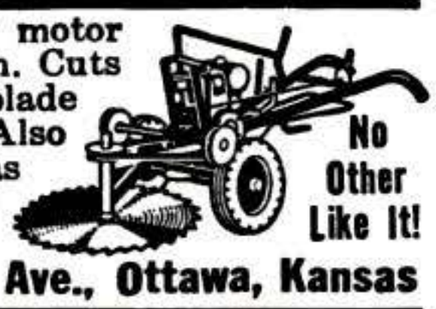
NEWARK ELECTRIC COMPANY, INC.

CHICAGO
323 W. Madison St.
Chicago 6, Ill.

New York City Stores: 115-17 W. 45th St. & 212 Fulton St.

Ottawa Self-Propelled Buzz Master

CLEARS LAND FAST! Powerful 6-HP motor with friction clutch for safe operation. Cuts down timber, brush and hedge; turn blade vertically and saw logs to length. Also furnished with post hole diggers. Has clutch pulley for belt work. Is fully guaranteed.



No Other Like It!

OTTAWA MFG. CO., 601 Brush Ave., Ottawa, Kansas

THE NEW IMPROVED MARK 218

22 POWER TELESCOPE

TELESCOPE

with leather carrying case

$22.50

FOR GENERAL OBSERVATION:

An ideal long range glass where high magnification is desired. Despite its high power it is only 12½ inches long and weighs less than one pound. The achromatic optical system includes six precision lenses. Quick-focus spiral screw eyepiece. Constructed of hardened aluminum with black crackle finish. FOR TARGET SPOTTING: Guaranteed to spot .22 holes at 200 yards in the black and 400 yards in the white. Can be focussed as close as 15 feet. FOR ASTRONOMY: The unusually high resolving power of the needle-sharp hard-coated lenses in this precision instrument brings out the moons of Jupiter, rings of Saturn, hundreds of mountains and valleys on the moon, phases of Venus, etc., in clear-cut relief. Highly recommended by leading experts. Price, including case, only $22.50.

40 mm dia. achromatic objective lenses, fluoride hard coated for brighter, clearer images.

●

Money back guarantee
Immediate delivery
We pay the postage

●

Adjustable tripod (illustrated)

$4.75

SEE IT AT YOUR LOCAL DEALER OR ORDER FROM

BROWNSCOPE CO.

Dept. 6P, 24 West 45th St., New York 19, N. Y.

Catalog of big values in binoculars, microscopes, etc., free on request

Sweeping the Country

Speed Sweep

THE BRUSH WITH THE STEEL BACK

Speed Sweep brushes are replacing old style brushes in thousands of factories, warehouses, and stores because they sweep faster, cleaner and easier. Speed Sweep brushes also outlast ordinary brushes 3 to 1. There is a Speed Sweep to meet every requirement. Write for styles, sizes and prices today.

Milwaukee Dustless Brush Co.
530 North 22nd Street
Milwaukee 3, Wis.

Please send me complete information about Speed Sweep brushes.

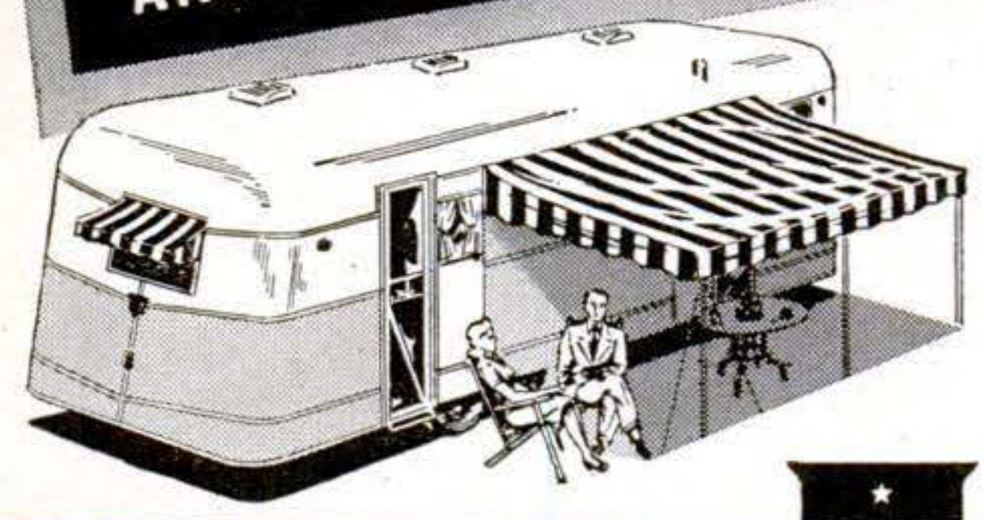
Name_____

Address_____

City_____ State_____

Copyrighted material

Luxury Living
ANYWHERE IN A SCHULT



...AND SO ECONOMICAL!

● Here's every facility of a well-insulated furnished home that you can take where you need it. . . . A QUALITY product that offers *full value* in years of satisfying service for a modest investment. Two sizes to suit purse and purpose. Write today for catalog.

26-FT. 3-ROOM LUXURY

The famous Luxury Liner, "tops" in living comfort. Three separate rooms, including living room shown above. Designed for maximum comfort on long stays.

21-FT. TRAVEL LUXURY

The Deluxe Commodore, a lighter yet amazingly spacious *travel* coach. Every real utility of "big" coaches. Accommodates four adults in comfort on extended trips.

SCHULT CORP., Dept. 3106 ELKHART, IND.
In Canada: John Inglis Co., Ltd., Toronto

SCHULT *Trailer Coaches*

PAINTERS' STRIPING TOOL

A TOOL... NOT A BRUSH

NEW, IMPROVED

Modern—streamlined—fits the hand like a fountain pen! Easy to use as a pencil. Draws parallel lines—straight, curve or circular. Does expert job on autos, furniture, toys, bikes, model planes, signs, bulletins, linoleum. (Makes wall board look like tile.) Every painter and craftsman needs one! Type "M" MASTER Painters' Striping Tool complete with tip for 1/16" stripe, $1.00. Extra tips 1/64", 1/32", 3/64", 1/16", 5/64", 3/32", 1/8"—75c each. Tool with complete set of 7 tips $5.00. (C.O.D. orders 25c extra.) Paint dealers, write!

$1.00 POST PAID

EASY AS USING A PENCIL!

WENDELL MFG. CO.
4234-A Lincoln Ave., Chicago 18, Illinois

FOR DAD, SAFER MOTORING

A HULL STREAMLINE AUTOMOBILE COMPASS

for Father's Day means no more lost directions, treacherous driving on wrong roads for Dad. Insist on the original Hull for accuracy, dependability. At your dealer's. Write for circular.

Price $3.95.

HULL MFG. CO., P. O. Box 246-E5, Warren, Ohio

FURNACES

Gas **Oil** Floor furnaces, RANGE burners, GAS burners for natural, mixed and liquid petroleum gases. GUNTYPE oil burners with controls. PRE-CAST fire boxes. BLOWERS, blower wheels, Bearings, etc. EVAPORATIVE COOLERS. COOLING coils. EXHAUST fans. SELL & INSTALL.

PEERLESS SALES, 4320 SHERIDAN BLVD., LINCOLN 6, NEBR.

IDEAS

AND INVENTIONS WANTED

Cash in on your Ideas, Inventions, Methods Now! Responsible Manufacturer gives complete protection on all Ideas, Methods, Inventions submitted—Costs you nothing. Write to

MASTERFORM TOOL CO., 2547 Irving Park Rd., Chicago 18, Illinois

SHAW "DU-ALL" GARDEN TRACTORS and MOWERS

Get FREE FOLDER NOW!

Get details on 1 to 9 H. P. walking and riding tractors. Do 1000 jobs on small farms, estates, orchards, gardens. Low-priced. Send postcard!

SHAW MFG. CO.
5706 Front St., Galesburg, Kans. 668PS N.4th St., Columbus, Ohio

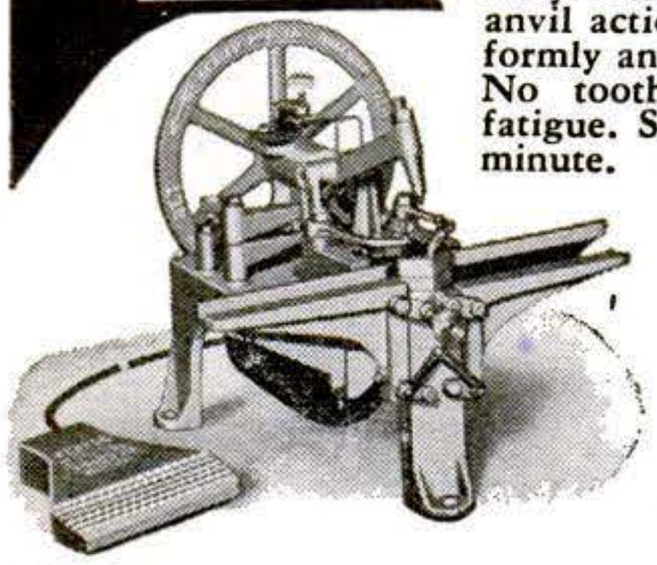
AUTOMATIC SAW SET AUTOMATIC RETOOTHER

HAND AND BAND SAWS

FOR HAND SAWS

● Set saw teeth automatically. Perfect hammer and anvil action sets teeth uniformly and tensions metal. No tooth breakage. No fatigue. Sets 400 teeth per minute.

● Makes New Profits! Cuts teeth in 50 seconds! Any size tooth 4 to 16 points. Old teeth fall off as chips. Simple to operate. A perfect job.

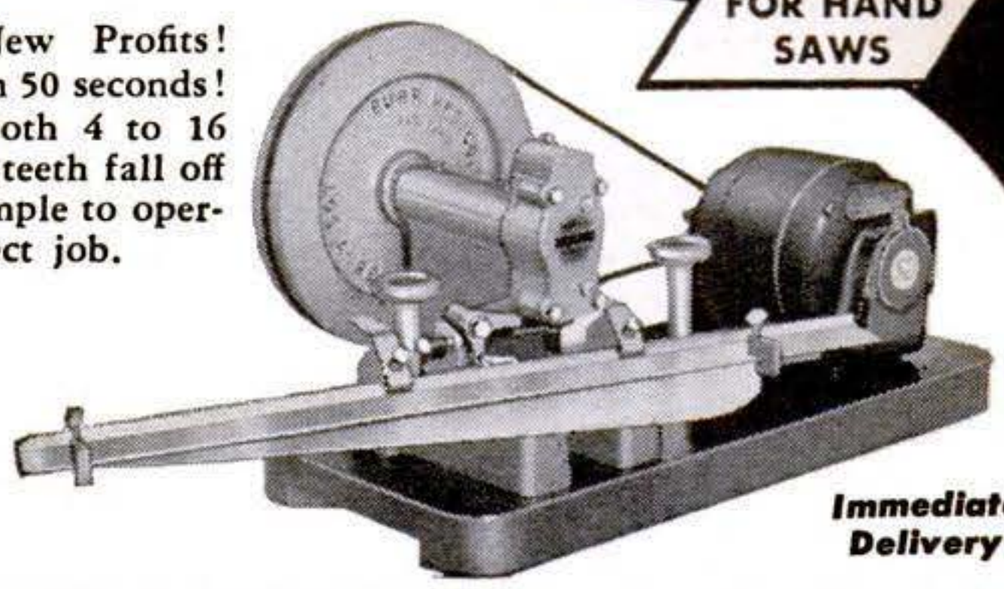


WRITE TODAY

Saw Shops Need These Machines For Greater Profit

●

With Motor



Immediate Delivery

BURR MFG. COMPANY, 8931-E Venice Blvd., Los Angeles 34, Calif.

Copyrighted material

GARDENING IS A CINCH with a BREADY!

All-Purpose Attachments

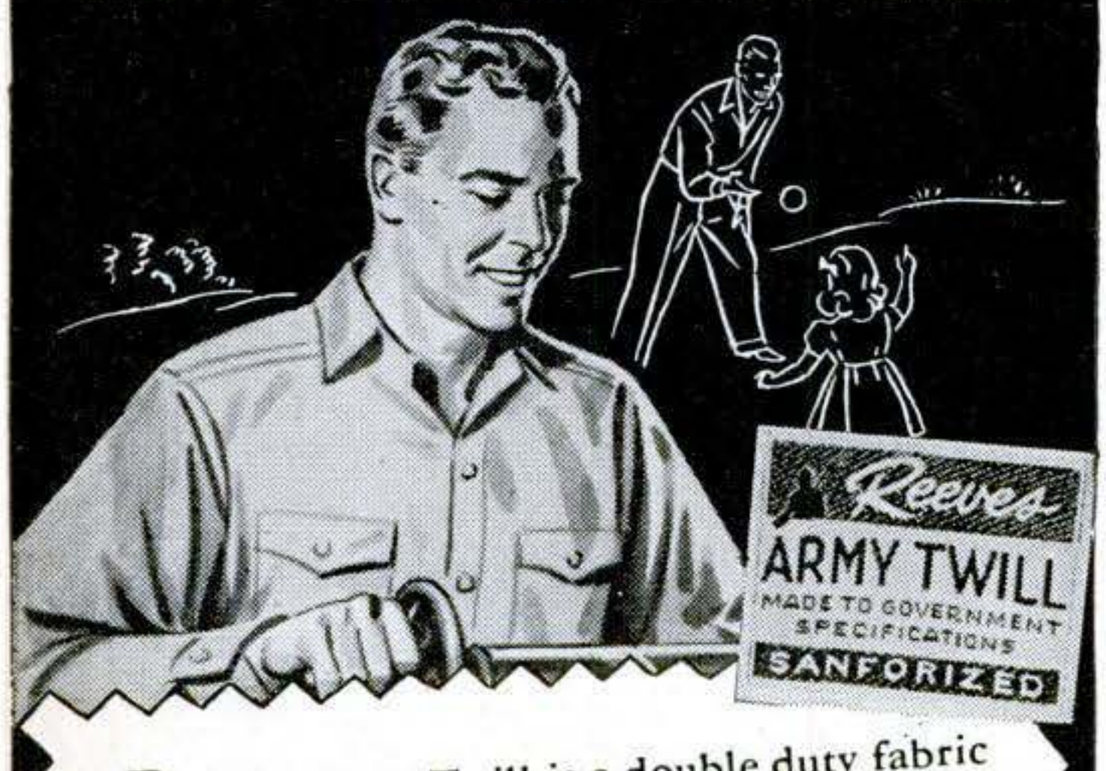
Plow, Cultivator, Disc, Cutter-Bar, Harrow, Snow Plow

You simply *guide* the BREADY Garden Tractor through the toughest gardening jobs. BREADY's big 1½ H.P. motor plus patented "front-hitch" gives power and traction to spare. Attachments hitched on in a jiffy. Turns "on a dime." Uses only 1 gallon of gas in 5 hours.

» *Write for free folder.*

GARDEN TRACTOR SALES CO.
BOX No. 213 SOLON, OHIO

GOOD WEAR FOR WORK
GOOD LOOKS FOR PLAY



REEVES Army Twill is a double duty fabric that's right for work and play. It's highly resistant to wear and tear, and its wide variety of vat dyed colors are fast to sun, water and perspiration. Being Sanforized*, it can take repeated washings and still come up fresh and new. For better looks and longer wear—demand Reeves Army Twill.

**Residual shrinkage less than 1%*

REEVES BROTHERS, INC.
54 Worth Street, New York 13, N. Y.

USE AC's FOR

UTMOST RELIABILITY

Dairies and milk producers use factory-recommended AC Spark Plugs to assure utmost reliability in milk delivery. Your AC dealer can supply you with factory-recommended AC's for your car, truck or tractor, designed for today's fuels and driving conditions.

Look for this sign

Spark Plugs cleaned and adjusted "By the AC Method" may save as much gas as 1 gallon in 10

AC SPARK PLUGS

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

Copyrighted material

McAleer

SIDE CAR CARRIERS

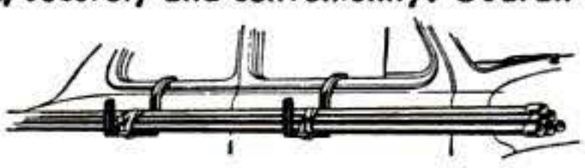
THOUSANDS NOW IN USE

Slips on or off any car in a jiffy

Will carry anything too big for the inside of your car

$4.50 PER PAIR COMPLETE

● Indispensable for carpenters, painters, plumbers, farmers, window washers, gardeners, campers, hunters, fishermen, home owners, salesmen, etc. Carries tent poles, lumber, pipe, oars, ladders, garden tools, fish poles, skis, etc., securely and conveniently. Guaranteed not to damage car finish. Instantly removable. Fully patented. Exclusive design.



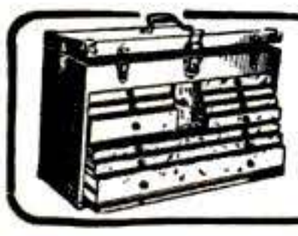
Shipped prepaid on receipt of check, money order . . . or C.O.D.

Or at your nearest dealer. Write Dept. 10.

SOLD ON 5 DAY MONEY BACK GUARANTEE

Makers of McAleer Automotive Cleaners, Polishes, Home Buffing Compounds, Waxes, Rust Removers

McALEER MFG. CO. Rochester, Michigan



MACHINISTS — TOOLMAKERS

Better construction of **Gerstner** Tool Chests, makes them better values. Free Catalog.

GERSTNER TOOL CHESTS
547 Columbia St., Dayton 7, Ohio

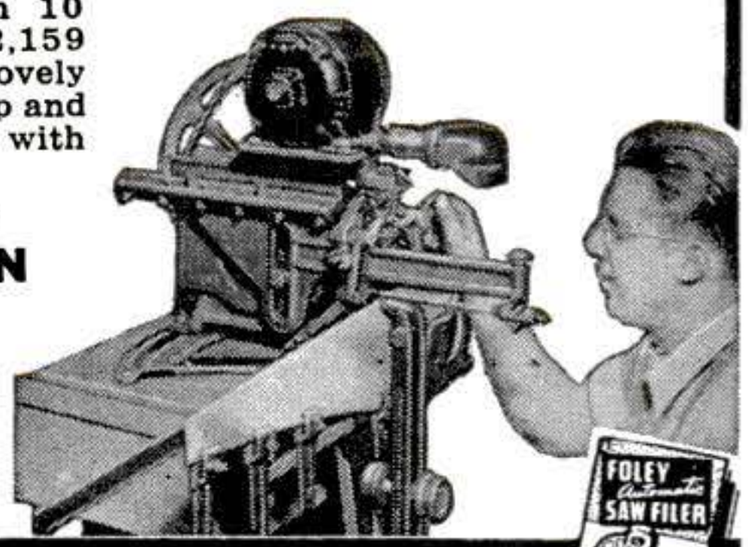
Start a SAW REPAIR BUSINESS!

MAKE A GOOD LIVING IN YOUR OWN BUSINESS— sharpening saws with the Foley Automatic Saw Filer. It makes old saws cut like new again. All hand saws, also band saws and cross-cut circular saws can be filed on this ONE machine.

THERE ARE HUNDREDS OF SAWS TO BE FILED in your own neighborhood, used by farmers, carpenters, homes, schools, factories, etc. W. L. Tarrant writes: "I left my old job last September and in 10 months have filed 2,159 saws. We have a lovely business worked up and cannot keep up with the work."

Send for FREE PLAN

Shows how to start this steady cash business. No experience needed. No eyestrain, no canvassing. Send coupon today.



FOLEY *Automatic* SAW FILER

FOLEY MANUFACTURING CO.
619-7 Foley Bldg., Minneapolis 13, Minnesota
Send Free Plan on Saw Filing business, no obligation

Name _____

Address _____

ELECTRICITY *Anywhere*

for HOMES FARMS SHOPS BOATS RADIO USE

● Onan gasoline-engine-driven Electric Plants supply reliable, economical electric service for any use. Portable, stationary or stand-by models. Water or air-cooled, compact and rugged.

A.C.: 350 to 35,000 watts in all standard voltages and frequencies. D.C.: 600 to 10,000 watts, 115 and 230 volts. BATTERY CHARGERS: 500 to 3,500 watts; 6, 12, 24, 32 volts.

Write for folder

D. W. ONAN & SONS INC.
2772 Royalston Ave., Minneapolis 5, Minn.

Onan PRODUCTS

MACHINE SHOP EQUIPMENT

Just off the press!—Every man who owns a workshop should have a copy of our new, up-to-the-minute, 200 page catalog of Machine Shop Equipment—the latest tools made by the biggest manufacturers in the U. S. Replete with illustrations, descriptions, prices. Prompt delivery on most tools listed in this book. Available at cost of printing—50c a copy—get yours today! **Price of Catalog Refunded on First Order over $5.00.** Send Check or Money Order to

CENTER TOOL CO., 153 Centre St., Dept. D, N. Y. C. 13

HUOT DRILL INDEX No. 29 $3

KEEP YOUR TWIST DRILLS CONVENIENT AND SAFE.

HUOT'S ALL STEEL DRILL INDEX No. 29 holds twist drills from 1/16th to 1/2 by 64ths. ORDER YOURS TODAY. Huot makes a Drill Index for every need. Eleven Sizes. Write for details or see your dealer. Get No. 29 today—Send $3.

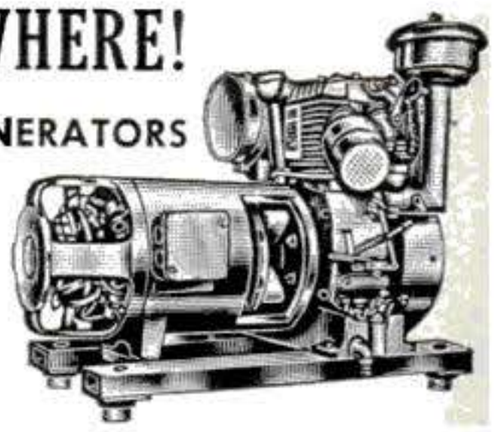
HUOT MFG. CO. 553 North Wheeler
ST. PAUL 4, MINN.

A.C. CURRENT ANYWHERE!

WITH

KATOLIGHT PLANTS AND GENERATORS

Furnish the same kind of Current as the highlines. Sizes 500 watts to 100 KW. Also Manufacturers of Rotary Converters, Frequency Changers. 32 and 110 Volt D.C. Motors in 1/4, 1/3 & 1/2 H.P. A.C. Motors (high line) in 1 1/2 and 2 H.P. only.



KATOLIGHT 1401 First Avenue, MANKATO, MINN.

WATCHES WANTED

BROKEN OR USABLE

All kinds. Highest Prices paid for jewelry, rings, spectacles, gold teeth, diamonds, Sterling Silver, etc. Cash mailed promptly. Write for free shipping container.

LOWE'S, Dept. PS, Holland Bldg., St. Louis 1, Missouri

STOP

CORROSION and FRICTION

Use Fiendoil on tools, electrical appliances, household devices. It actively

Lubricates · Cleans · Prevents Rust

3-oz. Spout Can **40c**

FIENDOIL

"The Enemy of Corrosion and Friction"

Copyrighted material

CONGRESS PULLEYS

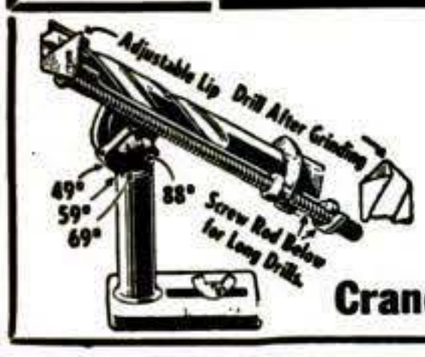
Still at PRE-WAR PRICES

America's finest pulleys—diamond-bored, tested for true-running—in all popular sizes, at your hardware store. Insist on Congress—your best buy in pulleys.

Sign of an Authorized Congress Dealer

CONGRESS *DIAMOND BORED* **DRIVES**
3750 EAST OUTER DRIVE DETROIT 12, MICHIGAN

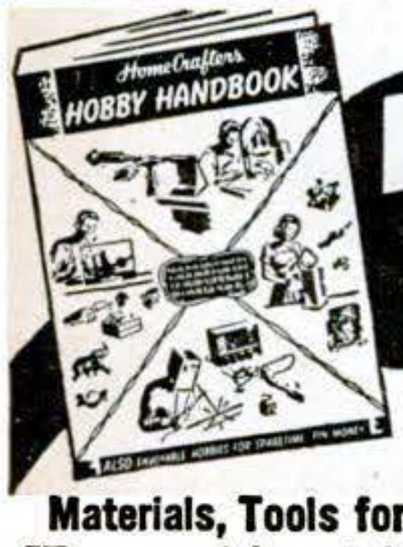
NONE BETTER! **SUPER DRILL GRINDER**



Sharpens round shank drills from 3/32" to 1 1/16" in diameter, up to 11" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels. Money-back guarantee.

Price only $2.95
At Dealers or Postpaid

Crandall Mfg. Co. 1512 W. Slauson, Dept. FB-18 Los Angeles 44, Calif.



FREE NEW HOBBY HANDBOOK

A Gold Mine of Information on Newest Equipment, Materials, Tools for HOME CRAFTSMEN AND MECHANICS

IF you work in metals, woods, plastics or glass, you need this Big, FREE Source Book of equipment, tools, parts and materials . . . including dozens of hard-to-get items you can't find in stores. Many things you must have for your home hobby or shop. Just loaded with ideas and illustrations.

A WAREHOUSE OF THINGS YOU WANT

More than 100 items including: Portable Welder; Bench Tools; Plastic Molder; Telephone System; Chemical Sets; Spray Guns; Electroplater; Drills; Grinders; Tool Chests; Model Tools; Key Maker . . . everything you need for your hobby or craft. Send for this Big, FREE Book TODAY. Mail postcard or coupon below.

WARNER ELECTRIC CO., 1512 Jarvis, Chicago 26, Dept. M 67

WARNER ELECTRIC CO., 1512 Jarvis, Chicago 26, Dept. M-67
PLEASE SEND BIG, FREE BOOK
NAME.....
ADDRESS.....
CITY..... ZONE..... STATE.....

FREE **Radio's Greatest Buying Guide!**

ALLIED'S NEW RADIO CATALOG

Send for this Big Value Book NOW!

Send for your FREE copy of the leading Buying Guide for Everything in Radio! Here's the handiest catalog for Servicemen, Dealers, Soundmen, Amateurs, Builders and Experimenters. Features the world's largest and most complete stocks of quality radio and electronic supplies—all at lowest prices! Get the equipment, the speedy service, the expert help you want, from ALLIED—Radio's Largest Supply House!

164 PAGES - - RADIO'S BIGGEST!

HUGE STOCKS—MORE THAN 10,000 ITEMS

Everything for every radio use: new model home radios, phono-radios, communications receivers, Ham kits and gear, radio parts, tubes, tools, test instruments, public address equipment, low-cost easy-to-build radio kits, diagrams, instructive radio books, radio's most complete stocks—all at lowest prices!

HELPFUL RADIO BOOKS!

Radio Formulas & Data No. 37-752	10c
Dictionary of Radio Terms No. 37-751	15c
Radio Circuit Handbook No. 37-753	25c
Radio Builders' Handbook No. 37-750	15c
Simplified Radio Servicing No. 37-755	10c
Radio Data Handbook No. 37-754	25c
ALL 6 BOOKS above No. 37-799	$1.00
Parallel-Resistance and Series Capacitance Calculator. No. 37-960	25c
R-F Resonance and Coil Winding Calculator. No. 37-955	25c

ALLIED RADIO

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 7-F-7
Chicago 7, Illinois

FREE CATALOG

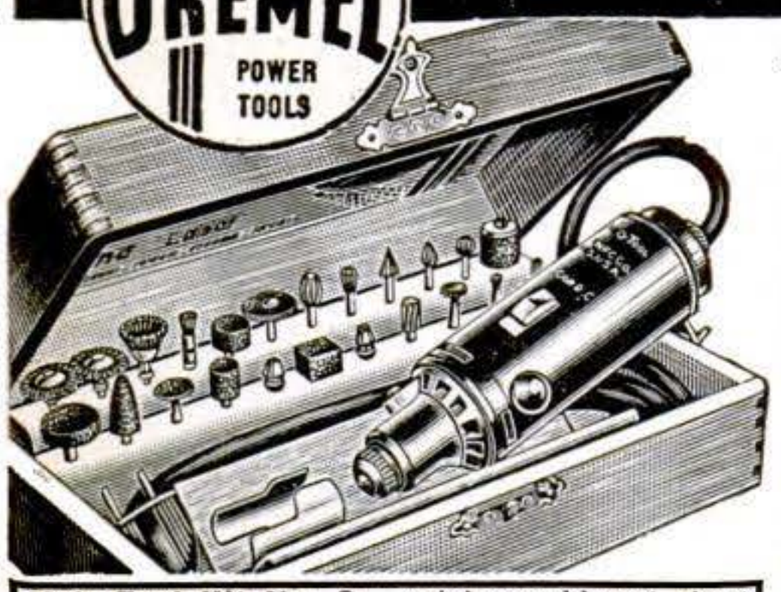
☐ Rush FREE 1947 Catalog
☐ Send 6 Books No. 37-799
☐ Send Books checked above } $.....enclosed
☐ Send Calculators checked above

Name.....
Address.....
City..... *Zone*..... *State*.....

Copyrighted material

MOTO-TOOL ★ THE "POCKET-SIZE" MACHINE SHOP

ELECTRIC DREMEL POWER TOOLS



"MAN . . . WHAT A POWERHOUSE!"

A TOOL THAT PACKS YEARS OF PLEASURE

Here's a tool to please a man's heart . . . one that holds promise of endless creative hours. Dremel Moto-Tool is a "war veteran" . . . used by all branches of the armed forces in far-flung repair bases . . . helped set production records at General Electric, Westinghouse, Remington Arms, Ford and others. Hobbyist or expert craftsman, first choice is Model 2 Moto-Tool Kit with its handsome felt-lined, highly finished wood case with rows of tools begging to be put to work. Write for FREE catalog of Moto-Tool attachments and accessories.

Moto-Tool Kit No. 2, with 23 accessories (**high speed steel** cutters, grinding wheels, polishing accessories) and heavy-duty professional Model 2 Moto-Tool in natural-finish, hardwood case . . . . **$23.50.** (Items purchased separately would cost about $30.00; you save $6.50.) **Moto-Tool No. 2** with one emery point **$16.50. Moto-Tool Kit No. 1** with 34 accessories and Model 1 Moto-Tool in wood case . . . **$17.50. Model 1 Moto-Tool** with one wheel point **$9.85.**

MOTO-TOOL FEATURES:

Oil-less, sealed, bearings • Patented automatic chuck lock pin • Oversize armature shaft, hardened, ground, polished • 110 Volt, AC-DC motor • Sliding snap-type switch • Cord protector • Shockproof bakelite housing • Dust-filtered, air-cooling system • Weighs only 13 oz. • Dynamically balanced for vibrationless operation.

MONEY BACK GUARANTEE: Buy Dremel Moto-Tool and Accessories from your dealer. If he cannot supply you, order direct from factory on 10 day trial. Shipped postpaid for cash in full; or for $2.00 sent C.O.D. for balance plus postage.

DREMEL MFG. CO.
Dept. 127-F . . . . Racine, Wisconsin

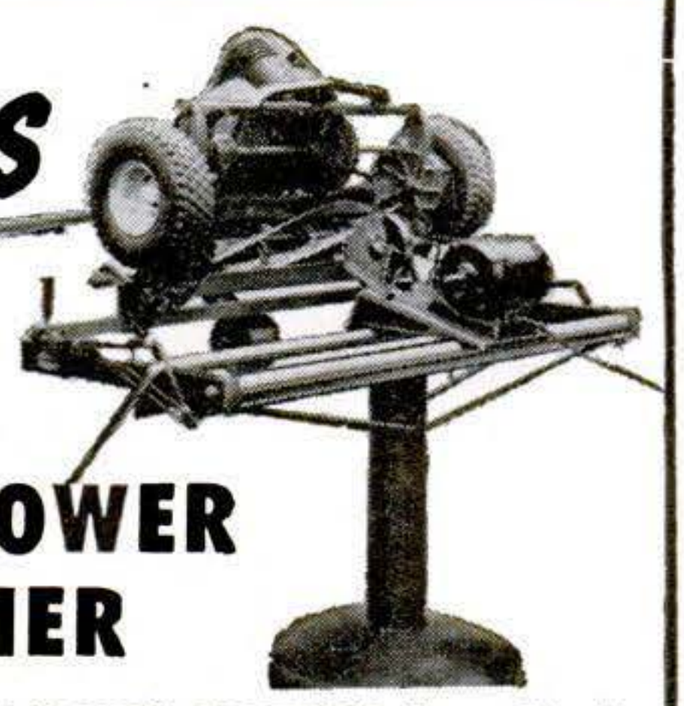
Do These Better-Faster

- ☐ Drilling
- ☐ Routing
- ☐ Sanding
- ☐ Engraving
- ☐ Touching-Up
- ☐ Mortising
- ☐ Polishing
- ☐ Cleaning
- ☐ Rasping
- ☐ Brushing
- ☐ Dressing
- ☐ Burring
- ☐ Grinding

APPROX. 27,000 R.P.M.

- ☐ Finishing
- ☐ Sharpening
- ☐ Burnishing
- ☐ Inlaying
- ☐ Sawing
- ☐ Scoring
- ☐ Carving
- ☐ Cutting

MORE PROFITS with MODERN LAWN MOWER SHARPENER



SHARPEN ANY LAWN MOWER from 5-inch Edger to 36-inch Power Mower in ten to twenty minutes with a MODERN LAWN MOWER SHARPENER because dismantling is unnecessary — neither handle, roller, wheels nor motor need be removed when sharpening any mower. . . . the MODERN SHARPENER eliminates all hand filing; it precision grinds to the extreme ends of both left or right reel blades. Bottom knife is held in same brackets for sharpening. NO EXTRA ATTACHMENTS! Order today! Price $241.50 (less motor) f.o.b. Pasadena (1/3 or 1/4 H.P. single phase motor recommended.)

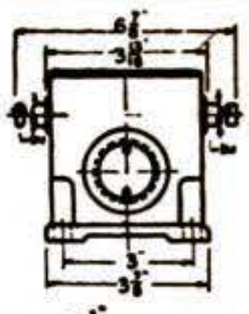
Modern Mfg. Co., 160 N. Fair Oaks, Pasadena 1, Calif.

SMALL EFFICIENT SPEED REDUCER

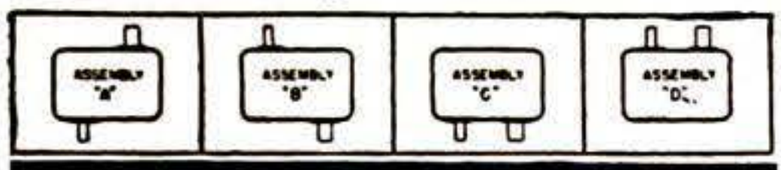
$18.56
NET — POSTPAID

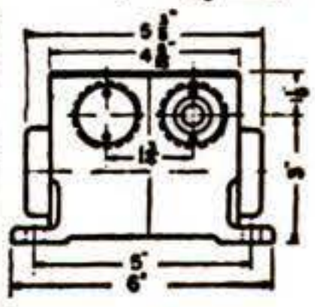
Just the thing for the Home Work Shop, Hobby Shop, Bench Work, Animated Displays, Light Production work. Used daily in thousands of homes and shops. Sturdy, compact, (see dimensions). Case of heat treated aluminum. Gears, SAE 65 (British) Gear Bronze. Worm of case hardened steel. Timken Bearings throughout. Torque capacity 100 inch pounds. Available in 4 different assemblies (shown below) and in these standard ratios:

4-1	25-1	64-1	200-1
8-1	30-1	75-1	200-1
10-1	40-1	80-1	400-1
16-1	50-1	100-1	600-1
20-1	60-1	150-1	800-1



When ordering be sure to specify assembly and ratio required. Shipping weight in carton, 8 lbs. Full money back guarantee. **Prompt deliveries.**





THE OHIO GEAR CO.
1426 EAST 179th ST. • CLEVELAND 10, OHIO

SOLID BRASS 12 FT. PORTABLE

RADIO ANTENNAS

Real $15 Value Now Only $4.95 Postpaid

FOR HOMES, BOATS or AUTOS

Just Out! Gov't surplus used on Army tanks. These telescopic rustproof antenna have tremendous pickup eliminate dangerous wiring. Solid Brass throughout practically insuring NOISE FREE RECEPTION.

12 Exceptionally Rugged Sections compress into 1 ft. 4 in. Handy for Camping Trips, also Useful for Transmitting, FM & Television sets.

Each antenna comes with clamps, nut, lug, and wire. Easy to install anywhere.

QUANTITY LIMITED

ORDER TODAY. A real $15 value for only $4.95 Postpaid. Send check or money order now. Money back in 10 days if not satisfied.

RADIO HOSPITAL 1113 Lexington Ave., Dept. B6 New York 21, N. Y.

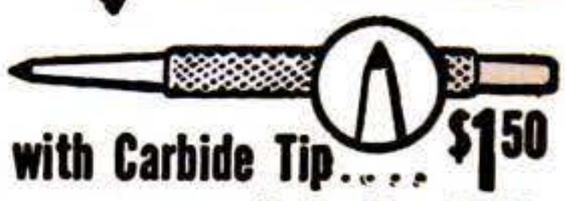
L-M CARBIDE SCRIBER

NON-MAGNETIC

$2.00
PRICE POST PAID

Tungsten Carbide — carefully ground on diamond laps, brazed into stainless steel 6" handle for marking steel and other metals — for etching, marking, cutting glass. In plastic case with pocket clip.

PRICK PUNCH



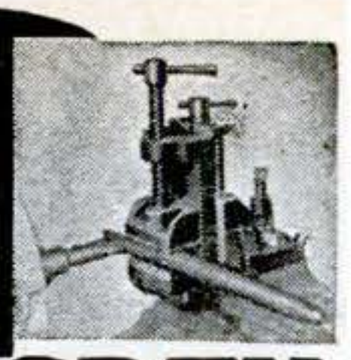
Tungsten carbide tip, silver brazed into 3½" heat treated steel body.

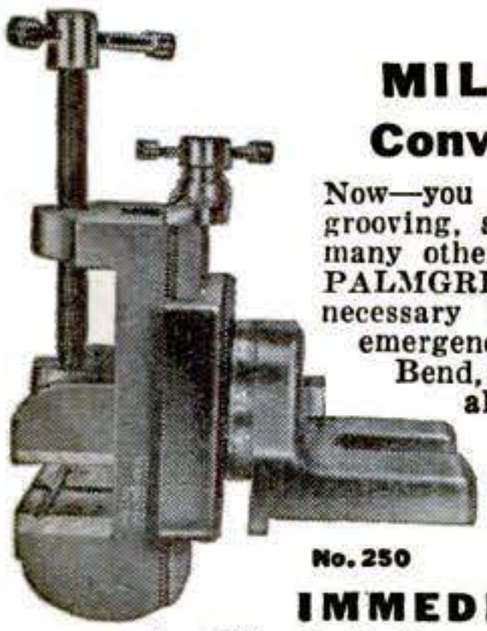
with Carbide Tip $1.50
Price Post Paid

LUCAS-MILHAUPT ENGINEERING CO.
5051 SOUTH LAKE DRIVE • CUDAHY, WISCONSIN

Copyrighted material

MILL IT ON YOUR LATHE WITH A PALMGREN





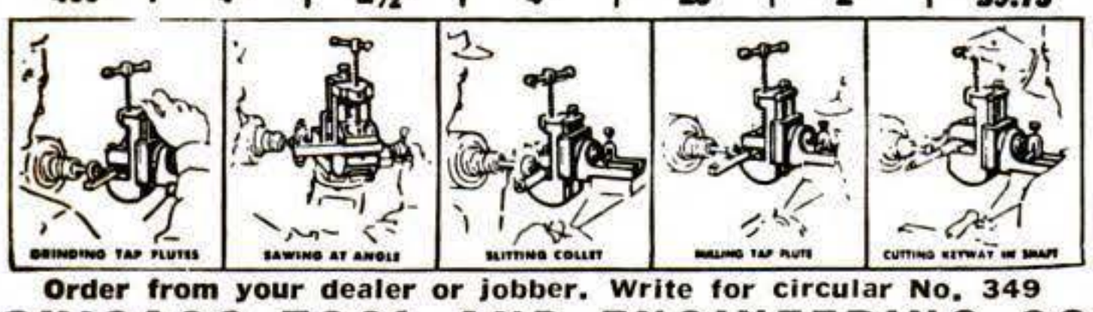
No. 250

MILLING ATTACHMENT
Convert Lathe in 10 Seconds

Now—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

IMMEDIATE DELIVERY

Nos.	Width Jaws	Depth Jaws	Jaws Open	Weight Pounds	Base Opening	Price F.O.B. Factory
150	1½"	1"	1⅝"	6½	1"	$18.75
250	2½"	1 7/16"	2½"	11	1¼"	24.75
400	4"	1½"	4"	25	2"	39.75



Order from your dealer or jobber. Write for circular No. 349

CHICAGO TOOL AND ENGINEERING CO.
Mfrs. of PALMGREN PRODUCTS for Over 28 Years
8396 South Chicago Avenue • Chicago 17, Illinois

PLANS FOR 5 PROJECTS *that are fun to build*

— only $1.00 postpaid

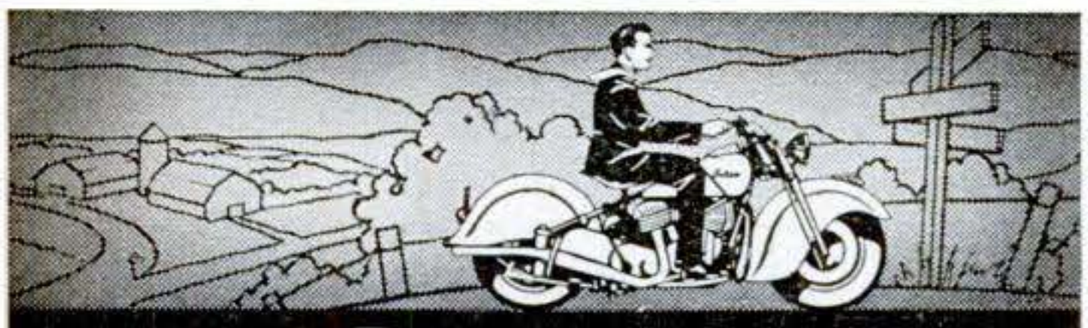
Special combination offer includes easy-to-read plans for: 1. Folding Lawn Chair 2. Child's Teeter Totter 3. Child's Glider Swing 4. 24-room Swallow House 5. Bird Feeder

Mail your dollar bill today! Ask for Package "Z".

DELTA MANUFACTURING DIVISION
Rockwell Manufacturing Co.
682F E. Vienna Ave., Milwaukee 1, Wis.

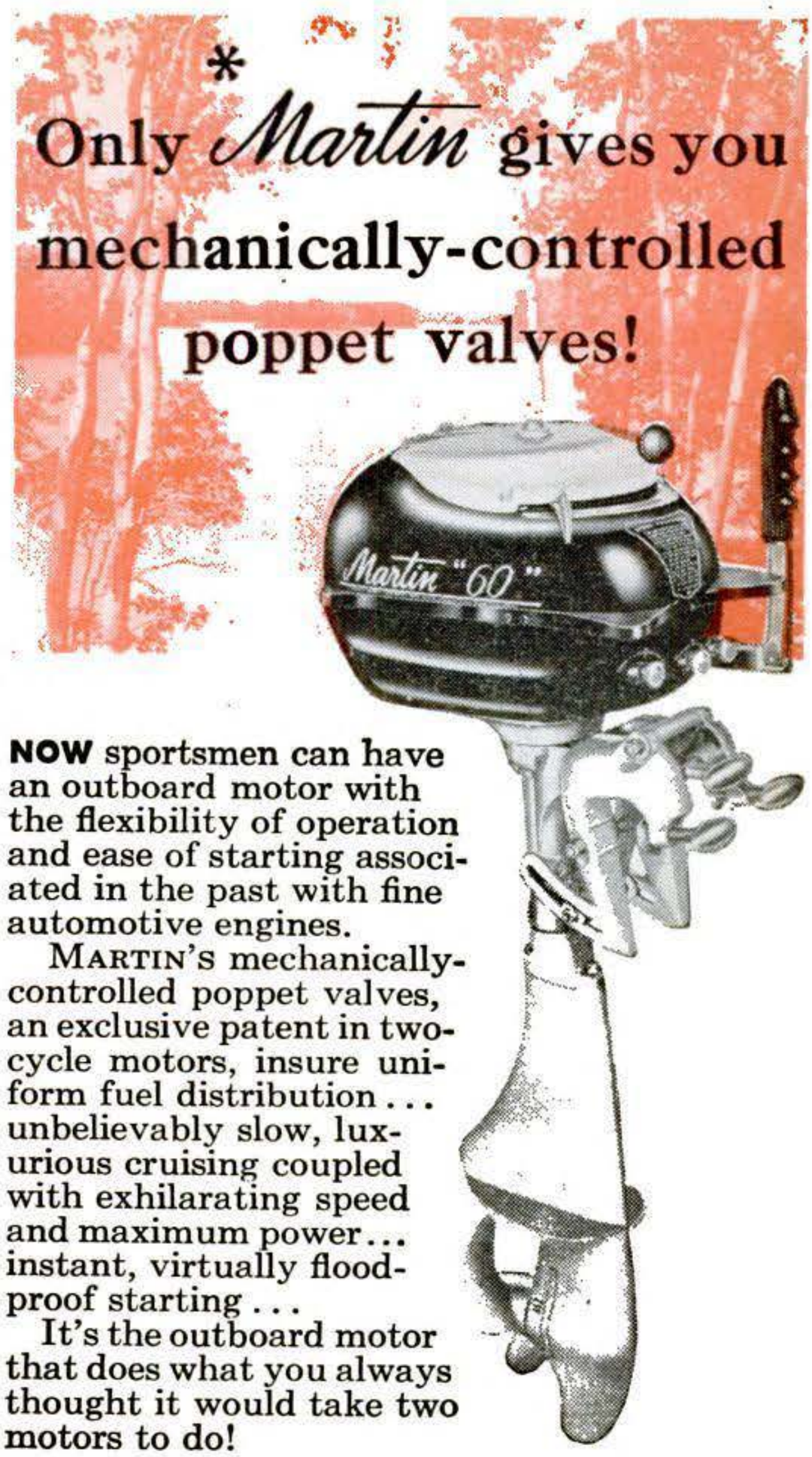
Deltacraft®

H-50



Indian
WORLD'S FINEST
MOTORCYCLE
SPRINGFIELD, MASSACHUSETTS

* Only *Martin* gives you mechanically-controlled poppet valves!



NOW sportsmen can have an outboard motor with the flexibility of operation and ease of starting associated in the past with fine automotive engines.

MARTIN'S mechanically-controlled poppet valves, an exclusive patent in two-cycle motors, insure uniform fuel distribution . . . unbelievably slow, luxurious cruising coupled with exhilarating speed and maximum power . . . instant, virtually flood-proof starting . . .

It's the outboard motor that does what you always thought it would take two motors to do!

MARTIN gives you all you'd expect in a fine outboard, *PLUS* many exclusive features—

★ **Power-head swivel, 360°** (patented)—Swings lower unit into boat, facilitates checking.

★ **New Martin Vertical Stern Adjustment** (patent pending)—Enables easy adjustment while underway.

★ **New Streamlined, Leak-proof Filler Cap**—Combines vent and spare shear pin clip.

Other highly desirable features: Full reverse steering • Steering stabilizer • Propeller clutch • Depend-a-pull starter • Easy grip stern bracket handles • Synchronized and centralized controls • Resiliently mounted handles and power head • Quiet underwater exhaust • Positive rotor water pump • Long-life sintered bronze rust-proof bearings • Positive oil and grease seals • Alternate firing.

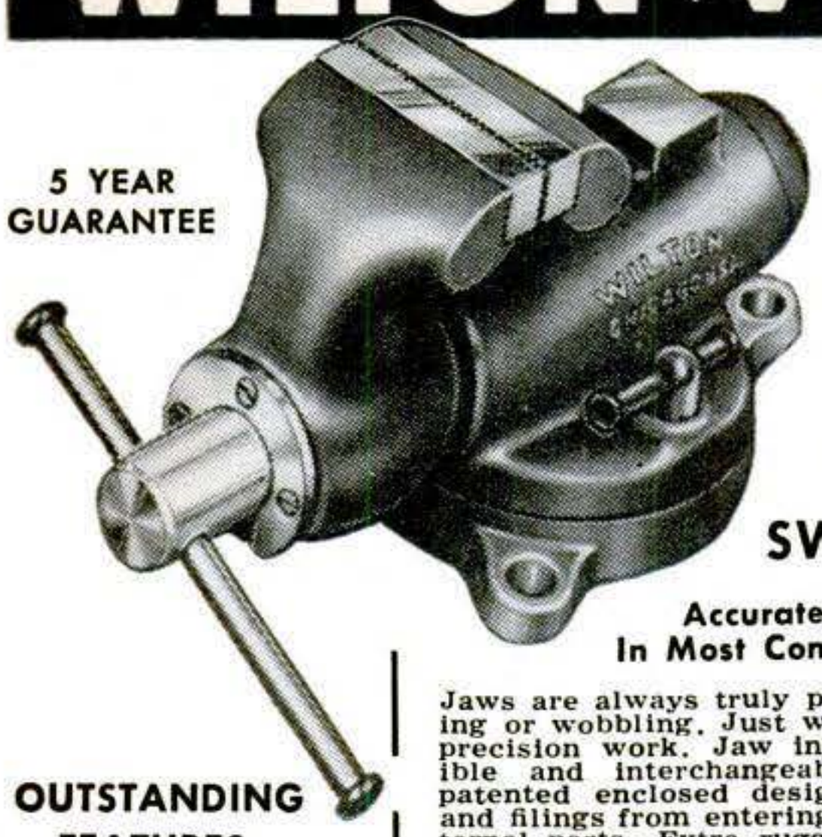
See the new MARTIN at your dealer's, or write for free booklet to: MARTIN MOTORS, Dept. PS 473, Eau Claire, Wisconsin.

Martin

***The New Standard of Performance in Outboard Motors**

Copyrighted material

WILTON VISE



5 YEAR GUARANTEE

"The Best Vise Money Can Buy"

FOR
Jewelers
Model Makers
Radio Repair and Home Workshops

SWIVEL BASE

Accurately Holds Work In Most Convenient Position

Jaws are always truly parallel—no shifting or wobbling. Just what you need for precision work. Jaw inserts are reversible and interchangeable. Streamlined patented enclosed design prevents dust and filings from entering and wearing internal parts. Extra rugged because head and nut are made from maleable alloy—53,000 lbs. tensile strength.
When ordering state if you want soft or hard steel jaws—with smooth or serrated faces. We recommend ordering an extra set of brass or copper jaws for special work. The Wilton Vise is a *Precision Tool* made for the man who likes to do *precision work*.

OUTSTANDING FEATURES

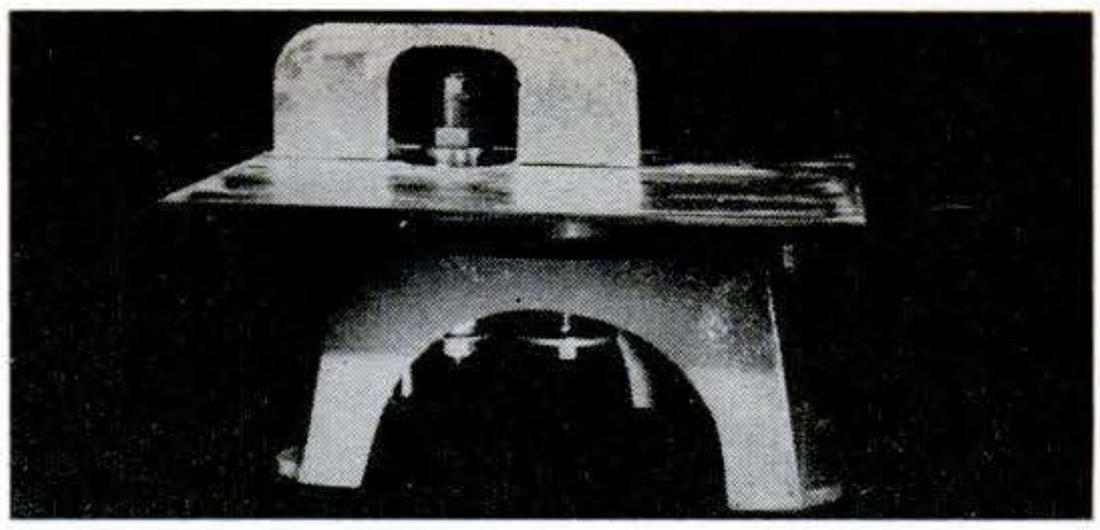
- Jaw Face Precisely Milled.
- Body Bored and Reamed.
- Unbreakable Horizontal Nut.
- Entire Base Surface and Movable Jaw Lathe Turned.
- Keyway Broached.
- Ground Anvil.

Satisfaction Guaranteed—We Pay Delivery Charges

Size	Without Swivel Base	With Swivel Base	Extra Copper or Brass Jaws (Indicate Choice)
2"	$ 9.85	$11.20	$2.34
2½"	11.45	14.05	2.46
3"	12.30	14.95	2.57

Wilton Vises are also available in industrial sizes up to 6 inches including combination pipe jaw types.
For catalog sheet describing larger industrial sizes, write Dept. B-6.

SHEFFIELD INDUSTRIAL SUPPLY CO.
2616 N. SHEFFIELD AVENUE · CHICAGO 14, ILLINOIS



WOOD SHAPER

Of grey iron and aluminum construction. High speed sealed in balled bearings. 12 x 16 inch table with ½ inch spindle.

Screw up and down table adjustment of over four inches. The fence is adjustable on the table.

Requires 1/3 to ½ HP motor. Will operate from either horizontal or vertical motor and is an ideal machine for the small cabinet shop or hobbyshop work.

If no dealer near you, write direct. Limited dealer territories open.

MURPHREE MANUFACTURING CO.
SYLACAUGA, ALABAMA

PLASTICS

Fabricating plastics offers you a fascinating hobby or a profitable business. New Carmen-Bronson Plastics Handbook tells you how; gives construction plans. New Carmen-Bronson Catalog lists all needed materials—Plexiglas, Lucite, Bakelite, Lignolite, Tenite II, Lumarith in sheets, rods, tubes, special shapes—clear and glowing colors. Also plastics dyes, cements accessories and supplies. 25c (refundable with first order), brings you both catalog and handbook. Send for them today.

CARMEN-BRONSON CORPORATION
165 East 3rd Street, Dept. 6-A Mount Vernon, N. Y.

make your TALLEST wish come True

instantly in

ELEVATORS*

TRADE MARK

HEIGHT-INCREASING SHOES
"YOUR PERSONAL PEDESTAL"

*TRADE MARK OF STONE-TARLOW CO., INC.

Why be satisfied with the "short end" of things when it's so easy to enjoy all the advantages that come from being taller. And you can be almost **1¾ inches TALLER** the *instant* you step into a pair of **"ELEVATORS"**. *Secretly*, too, for the heels are no higher.

Send for free booklet

STONE-TARLOW CO., Inc. Dept. PS6-47
Brockton 68, Mass.
Please send me Free Booklet and name of nearest dealer.

Name _____
(Please Print)
Address _____
City _____ *State* _____

The Original and Genuine "ELEVATORS"
Manufactured Exclusively by Stone-Tarlow Co., Inc.

BUILD YOUR OWN FAN

with that old motor

One piece cast aluminum propeller used for cooling and ventilating. Also available to dealers at discount.

Let us give you our prices on your aluminum castings.

Size Inches	Polished 2 Blade	Polished 3 Blade	Unpolished 2 Blade	Unpolished 3 Blade	Bore Inches
15	$2.50	$3.50	$2.00	$3.00	½ ⅝ ¾
18	3.00	4.00	2.50	3.50	½ ⅝ ¾
20	3.25	4.25	2.75	3.75	½ ⅝ ¾
24	3.50	5.00	3.00	4.25	½ ⅝ ¾
30	5.00	.	4.00		½ ⅝ ¾

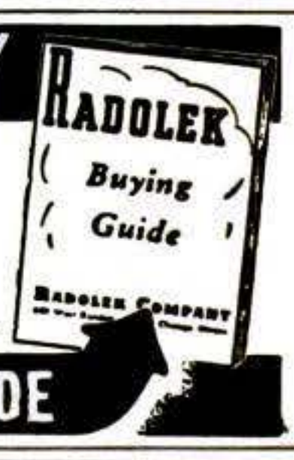
KLOPPENBORG ALUMINUM FOUNDRY, Dept. P.S. 67, Davenport, Iowa

Balance 4" x 9" Base
With either Metric or Avoirdupois Weights..... **$6.00**

Catalog with 3000 illustrations of laboratory Apparatus sent for $1.00. Catalog of 100 scientific books, 10 cents.

LABORATORY MATERIALS CO.
7317 Vincennes Ave. Chicago 21, Ill.

Everything in Radio!



Make **Radolek** your buying headquarters for Radio-Electronic repair and replacement needs. Large stocks assure finest, most complete selections of all available items at lowest prices. Your orders receive special attention for fastest delivery. Send today for FREE **Radolek Buying Guide.**

RADOLEK CO., Dept.A-127, 601 W. Randolph St., Chicago 6, Ill.

FREE RADIO BUYING GUIDE

WOODWORKERS ... Get this

CONSTANTINE MASTER MANUAL

Get the Most Fun From Your Hobby

Indispensable to woodworkers. Newest, biggest edition, more pages, more color, helpful how-to-do-it articles, pre-war and new items, more bargains. Send 25c today and we will include *FREE! FULL YRS. SUBSCRIPTION* to Chips and Chats, published bi-monthly. Keeps you up-to-date on everything in woodworking, offers big money-saving bargains. Send now.

ALBERT CONSTANTINE & SON, Inc.
793-F 135th Street, New York 54, N. Y.

Copyrighted material

Do a Better Job
WITH ONE OF THESE
EMPIRE LEVELS

EMPIRE TORPEDO LEVEL

Smallest, most handy and accurate Level made. "Cigar-shaped"—no sharp corners to tear pocket. Aluminum stock. Only 3 oz. wgt. 9" long. Has Level, Plumb, 45° Vials.
No. 26 ..... $1.75

ALUMINUM LEVEL — No. 151

Cast and Machined, a Beautiful Tool, with Patented, Removable Level and Vial.
With 2 Plumb, 2 Levels, 2 — 45° Vials. 18" $6.00
24" ..... $6.50 28" $7.00

Order EMPIRE LEVELS from your local dealer. Write direct for literature.

EMPIRE LEVEL MFG. CO.
707 S. 6th St. Milwaukee 4, Wis.

LAW

STUDY AT HOME for PERSONAL SUCCESS and LARGER EARNINGS. 38 years expert instruction —over 108,000 students enrolled. LL.B. Degree awarded. All texts furnished. Easy payments. Send for FREE BOOK—"Law and Executive Guidance"

AMERICAN EXTENSION SCHOOL OF LAW
Dept. 78-S, 646 N. Michigan Ave., Chicago 11, Ill.

$$$$ if trained in arc welding

Big income jobs await you. Learn quickly and thoroughly. Enroll under G. I. Bill. Write today.
Hobart Trade School, Inc., Box P-563, Troy, O.

FREE TRAILER PARTS CATALOG

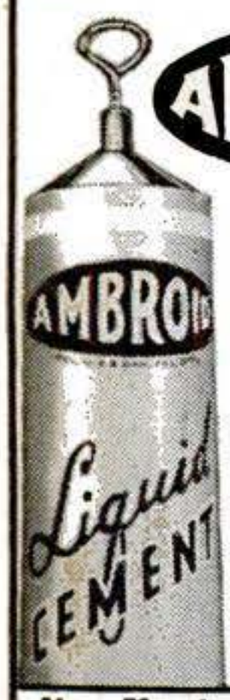
"Safety Engineered"

BULL DOG Hitches & Parking Jacks.
TORQ-LESS Axles,
Drop a card to Box D-46
HAMMER BLOW TOOL CO., WAUSAU, WIS.

$13.50 Value for Only $2.49

8000 ohm impedance Head Phones, produced to Air and Signal Corps specs. Extremely sensitive, lightweight (only 9 oz.). With 5½ ft. cord, plug, jack and ear cushions. Every One BRAND NEW.
No. 17A37, Special Per Pair **$2.49**
Plus 25c each for Postage.

Burstein-Applebee Co. 1012 McGee, Kansas City 6, Mo.



THE UNIVERSAL LIQUID CEMENT

The "Mr. Fix-it" for "a million things"

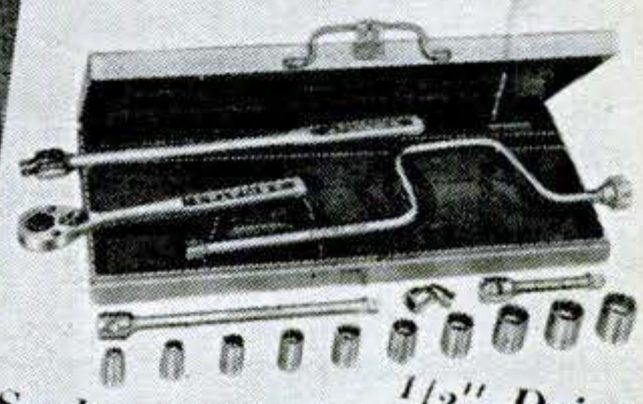
Tops in quality for 37 years. Uses unlimited . . . sticks and mends permanently. Waterproof . . . quick drying. Keep a tube on hand always. Extra quality . . . extra strength. Ready to use. LOOK! Get acquainted with Ambroid quality. At your dealers or send 25c for big 2-oz. tube postpaid (U.S.A. only). Money back guarantee. **25¢**

Also 50c 4-oz. tube. Pts., qts., gals. for industrial use.

AMBROID CO.
307 Franklin St., Boston 10, Mass.

LUCKY 13 FOR TOOL USERS!

WRENCHES · PLIERS
PUNCHES · CHISELS
SCREWDRIVERS
SPECIAL TOOLS
SOCKETS & HANDLES
PULLERS
TOOL BOXES



½" Drive Socket Set for Nut Turning

Production 13 times as great as in 1940 permits Plomb to make finer tools than ever at prices close to pre-war levels—even below on some. Make your job more profitable—get tools you'll be *proud* of from your Plomb dealer today!

Write for catalog to

PLUMB TOOL COMPANY
2257E Santa Fe Avenue
Los Angeles 54, California

4762

PLUMB *Streamlined* TOOLS

Copyrighted material

Announcing

THE BARRON DRUM SANDER FOR DRILL PRESS USE

● Another new Barron development. Will fit any 1/2" drill press chuck, collet chuck, adapter or 1/2" I.D., Spindle. Has 1/2" ground steel shank, rubber cylinder, compression cups, light steel cylinder and full length arbor. Extra light in weight, runs smooth as a top. A fine, precision sander, complete with 5 sanding sleeves 2 1/2" dia. x 3" long. The first drum sander of its size and design ever offered at so low a price! Try it on our 10 day money back guarantee.

$3.95 COMPLETE

$7.50 COMPLETE

MULTI-PURPOSE DRILL PRESS PLANER

The greatest all-purpose drill press tool on the market. Planes, parallels, rabbets, routs, panels, beads, tenons, grooves, etc. NO EXTRA BLADES TO BUY! It's complete, ready to use. Does any or all operations without a single blade change or adjustment. Harmless to drill press. Safe, accurate, perfectly balanced. Over 75,000 now in use!

OTHER DRILL PRESS ACCESSORIES

4" ROTARY SURFACE SANDER $5.95 — 1/2" DOVETAIL CUTTER $1.85
ALL-METAL AUXILIARY DRILL PRESS PLANING AND SHAPER TABLE $9.85
TAPERED AND THREADED SPINDLE ADAPTERS
ROUTER AND ROUND END MORTISING BITS 1/8" TO 1/2" SET OF 6 $9.50

Liberal 10 Day Money Back Guarantee

Workshop Guide FREE

BARRON TOOL CO.
570 Architects Bldg., Detroit 1, Mich.

BARRON PRECISION WORK SHOP TOOLS

Say You Saw
It In Popular Science

free CONCORD Radio Catalog

RADIO PARTS • RADIO SETS • RECORD CHANGERS — PLAYERS • KITS • HAM GEAR • AMPLIFIERS • TESTERS

It's here! The big, new 1947 Concord Catalog with a vast, complete selection of everything in Radio and Electronics for building, experimenting, testing, repair and maintenance. Thousands of items—hundreds now available for first time—latest 1947 prices. Now LOWER prices on Radio Sets, Receivers, Kits, Record Changers, Players, Portables, Amplifiers. Latest listing standard items. Complete stocks—IMMEDIATE SHIPMENT. Write for FREE COPY—please address Dept. PS-67.

CONCORD RADIO CORP.
LAFAYETTE RADIO CORPORATION
CHICAGO 7 — 901 W. Jackson Blvd.
ATLANTA 3 — 265 Peachtree Street

CROSMAN Silent RIFLE

POWER without POWDER

You'll like a Crosman because there is no recoil to spoil your aim . . . no noise . . . no odor . . . no cleaning! Rifled barrel for greater accuracy . . . adjustable power, too, for short or long range shooting indoors or out. Available in .177 and .22 cal. models.

WRITE FOR COMPLETE INFORMATION

CROSMAN ARMS CO., INC.
9 HENRIETTA ST., ROCHESTER 7, N. Y.

Shoot CROSMAN SuperPells

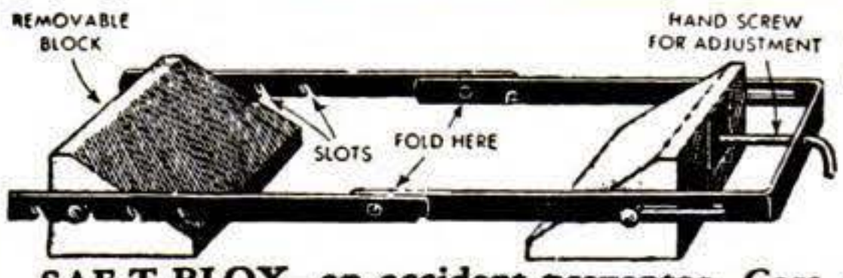
The BETTER Ammunition for ALL .177 and .22 caliber Air Pistols and Rifles.

.177 cal. . . $2.50 per M
.22 cal. . . $3.00 per M
POSTAGE PREPAID
At your dealer or order direct

FOR GREATER ACCURACY • MAXIMUM POWER

CROSMAN ARMS CO. HENRIETTA ST., ROCHESTER 7, N. Y.

Safety WHEEL BLOCKING DEVICE



• No Rolling
• No Slipping

$2.75

SAF-T-BLOX—an accident preventor. Cars can't slip off raised jacks *anywhere!* Sets up in 30 seconds. Send $2.75, plus 20c for prepaid postage.

MODERN DEVICES, INC. 141 W. Jackson Blvd. Chicago 4, Illinois

MAKE MAGIC YOUR HOBBY

BE A MAGICIAN FOR FUN OR PROFIT!
Rush 25c; for first issue of "MAGIC IS FUN," new magazine that teaches how to do tricks with coins, cards, ropes, etc. FREE, with order, large catalog of magical apparatus.
D. Robbins & Co., Dept. M-99, 152 W. 42 St., N.Y. 18, N.Y.

ILLUSTRATED COMIC BOOKLETS
THE KIND MEN LIKE!
(VEST POCKET SIZE)
They are loaded with rare cartoons. Full of Fun and Humor. ***20 DIFFERENT*** booklets sent prepaid for $1 in plain wrapper. Sorry . . . no C.O.D.'s.
GRAYKO, Dept. 1069, Box 520, G.P.O., N.Y.C. 1

DECORATIVE METAL WORK

A new manual for the amateur. Tells in easy to understand language how to make useful metal articles in your home workshop. You'll be surprised how easy and interesting metal work really is. **Fully illustrated** with diagrams and step-by-step instructions. Sturdy cloth binding, 253 pages. Send only $2.00 and your copy will be sent postpaid.

POPULAR SCIENCE MONTHLY—Dept. 67
353-4th Ave. New York 10, N. Y.

NU-WAY LAWN MOWER

Write for FREE *Circular*

Price **12.50**
Why Pay More

Build Your Own
Rotary Type Lawn Mower
We Supply Cutting Unit Complete.

NO INCREASE IN PRICE

TRACTOR-LITE MFG. CO., SPIRIT LAKE, IOWA

Copyrighted material

NAVY STANDARD BATTERY (Brand New)

Made by Gould Storage Battery Corp. 6 volt 15 amp hour. Excellent for motors, motorcycles, amateurs, experimenters, radio servicemen, &c. Shipped dry, with complete instructions for charging. 4⅝" wide 4¾" deep 6¾" high. Shipping weight 12 lbs. While they last **$4.95**

French Type PHONE

TS-13C Hand Set

With butterfly switch on handle. When the switch is pressed, the microphone is connected into the circuit and an additional set of contacts are closed, to operate a change over relay. Has a 6 ft. length of cord, with a PL 55 plug for earphone and PL 68 for microphone and switch. Impedance of earphone approx. 2500 Ohm; impedance of microphone approx. 250 Ohm (carbon); connected with batteries it can be used for inter-communication system. They are brand new and the original cost is many times what we are offering them to you . . . while they last. **$3.95**

MICHAEL STAHL, Inc.
39 Vesey St., Dept. SP6 New York 7, N. Y.

MAGIC LIQUID CASTS PLASTICS

THE GREATEST THING IN PLASTICS! A magic liquid plastic; just pour **PLASTICAST** into any kind of mold or container and it hardens in a few minutes to a solid, smooth, clear as glass plastic! No machinery or tools required. **PLASTICAST** has **UNLIMITED POSSIBILITIES**, novelties, toys, jewelry, knick-knacks, statuary . . . fascinating, brilliant, sparkling clear or colored plastic articles . . . an endless variety of useful things. Being transparent it is ideal for imbedding flowers, coins, photos, souvenirs, charms, etc. **MAKE PLASTICASTING A THRILLING NEW HOBBY OR A PROFITABLE BUSINESS!** No experience required; start casting 10 minutes after you receive your outfit. You'll be amazed at the things you can make! Full instructions and accessories provided for making about 200 articles. *COMPLETE MASTER OUTFIT, $3.00 Ppd.*

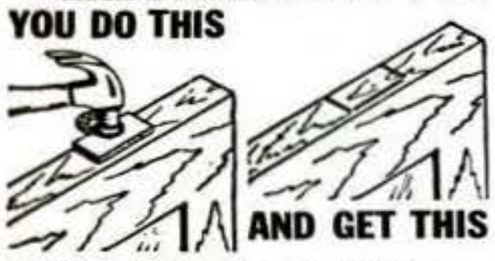
FREE **PLASTICS MANUAL & HOBBY CATALOG.** Tells you how to make plastic things, their properties and other valuable information. Sent free for 3c stamp.

PLASTICAST CO., Dept. A *(Send order to nearest office)*
5961 Madison St., Chicago, Ill., P. O. Box 987, Palo Alto, Calif.

HANG THAT DOOR THE PROFESSIONAL WAY!

USE THE TIME SAVING —LABOR SAVING . . .

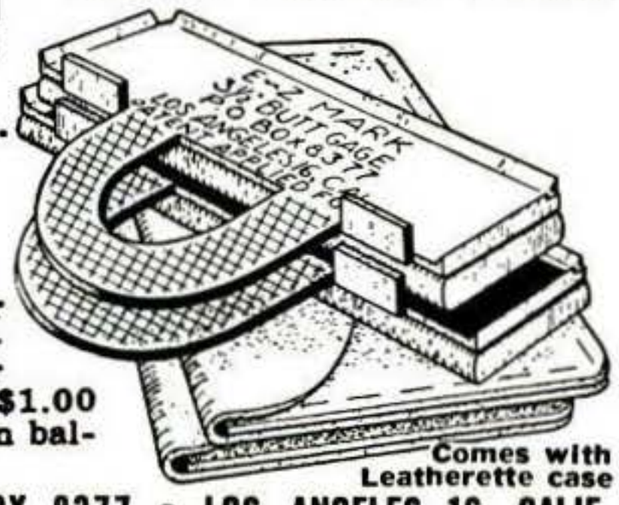
YOU DO THIS



AND GET THIS

E-Z MARK BUTT GAUGE

You get a clean cut deeply etched profile. Remove chips. Repeat this operation on the jamb and hang the door. THAT'S ALL—NO MORE!



Comes with Leatherette case

- Hang more doors better.
- No adjustments. No errors.
- Used and approved by Master mechanics.
- Comes in 3½" and 4" (standard) sizes.
- Precision made.

Cost ONLY $1.75 each or $3.00 a set at your hardware store. If your Dealer can't supply you send only $1.00 with order and pay Postman balance, plus postage C.O.D.

E-Z MARK TOOLS • P. O. BOX 8377 • LOS ANGELES 16, CALIF

Gasoline Drive Arc Welder

"Build Your Own" Generator

A.C. Arc Welder

Check through these money-making features:

THEY'RE SIMPLIFIED . . . sturdy and compactly built from finest materials, gives you outstanding performance. Has convenient controls.

SMALL INVESTMENT . . . when compared with the bigger profits and superior quality welds you get with a HOBART "behind the arc."

IMMEDIATE RETURNS . . . from profitable welding jobs in the field, in production and on maintenance work. Multi-Range Dual Control and Remote Control save time, cut costs.

"BUILD YOUR OWN" ROAD TYPE WELDER . . . HOBART shows you how to save from $300 to $500 by building your own welder, using a HOBART Generator only, a reconditioned auto engine and chassis. Booklet on request, tells you how.

HOBART A.C. WELDER FOR SINGLE PHASE . . . Specially designed to bring improved alternating current welding performance to shops having only single phase 220 volt power.

BECOME AN EXPERT . . . ENROLL IN HOBART SCHOOL . . . The best of training at low cost, use latest up-to-date equipment. Learn in a modern building with complete equipment and experienced teachers.

HOBART BROTHERS CO.,
Box P-67, Troy, Ohio, U.S.A.

"One of the World's Largest Builders of Arc Welders."

Hobart

Free! Literature and details. CHECK.

HOBART BROS. CO., Box P-67, Troy, O.

Send me information on items checked, no obligation.

☐ *Gas Drive Welder* ☐ *"Build Your Own"*
☐ *HOBART A.C.* ☐ *Electric Drive*

NAME_____

ADDRESS_____

_____

Copyrighted material

Now A DYNAMIC Super-charged WELDER

IDEAL FOR AUTO • HOME APPLIANCE • FARM REPAIRS

DESIGNED TO DO HIGH GRADE WELDING INEXPENSIVELY!

Maintenance Men; Farmers; Mechanics; Machine Shops; Foundries; Auto, General Repair and Job Welding Shops; all using the DYNAMIC find it so indispensable and useful that they cannot afford to be without it. If inexperienced you can easily learn to do a variety of high grade welding jobs by following the practical, simplified operating and welding instructions furnished. Once you see a DYNAMIC in operation, you won't want to be without it. Its simplicity will amaze you. In a year the DYNAMIC only costs you about 6c a day. Helmet, rods, cables, holder and operating instructions, etc., furnished.

SAVES YOU VALUABLE TIME AND MONEY!

This portable industrial transformer type DYNAMIC WELDER easily carried right to the job, can be operated from any convenient, properly wired **110 Volt, 60 Cycle Line** — has 8 metallic and carbon arc welding heat stages —does work you would think only possible with a larger more expensive machine. Can also be supplied for 220 volt, 60 cycle operation and other voltages and cycles at slight additional cost. Works on Iron, Steel, Brass, Bronze & other metals.

DYNAMIC WELDER CO., 13 East 23rd St., SF, Chicago 16, Ill.

ONLY $28.50 COMPLETE

Available Now

IMMEDIATE DELIVERIES

Write Today for Particulars

GET DETAILS on our 10 day Trial Offer.

Member Chicago Association of Commerce.

When you want to fix things fast . . . remember Weldwood Glue. It's quick to mix . . . easy to use . . . tremendously strong . . . stain-free . . . rot-proof . . . and permanent. At hardware stores, lumber yards, chain stores.

WELDWOOD

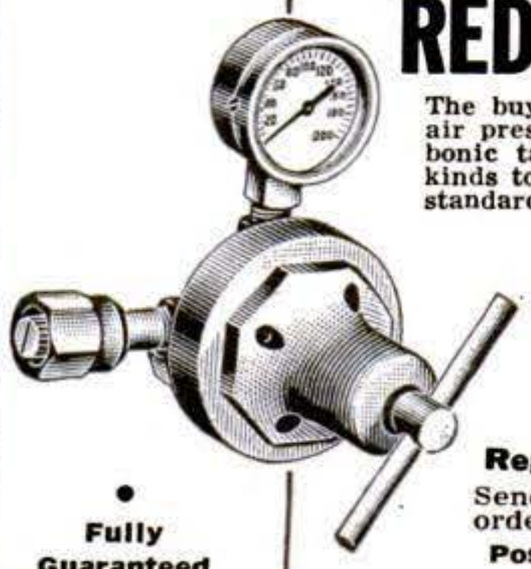
PLASTIC RESIN

WATERPROOF GLUE

United States Plywood Corporation, New York 18, N. Y.

A GREAT SURPLUS BARGAIN

REDUCING GAUGE



The buy of a lifetime in a standard make air pressure regulator. Used on liquid carbonic tanks and air pressure tanks of all kinds to regulate the pressure. Fitted with standard ½ inch pipe thread. Dial calibrated 0 to 200 lbs. Made by U.S. Gauge, Air Reduction Co., Walter Kiddie — all famous makers. Used by artists for air brush work, sign painters, retouchers, etc. Used by soda fountains and taverns. All brand new. Satisfaction guaranteed.

• Fully Guaranteed •

Regular $15.00 Value

Reg. $15.00 Value $5.95

Send check or money order. Ship same day.

Postpaid in U.S.A.

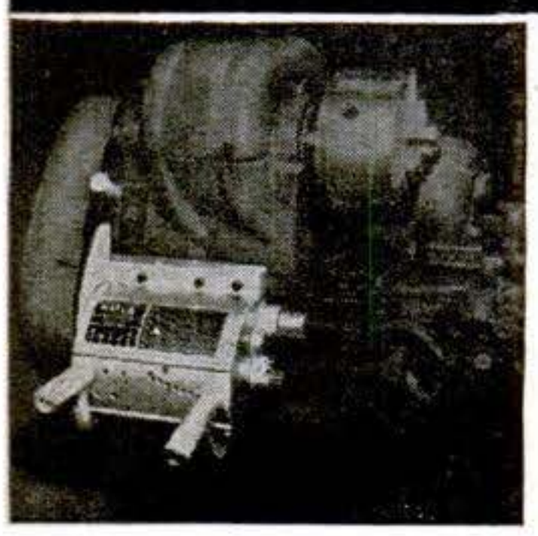
GROBAN SUPPLY CO.

1522 So. Michigan Ave. (Dept. PS6) Chicago, Ill.

WAKE UP YOUR SCALP Want better looking hair? Embarrassed by falling dandruff, itching scalp? Then try VITABRUSH, new electric driven scalp brush that gives your scalp a vigorous and invigorating "workout" in just three minutes of fun. Cleans scalp. Stimulates blood supply. Restful. Pleasant. Write *today* for complete information and satisfaction-guaranteed offer.. Hershey Mfg. Co., 3718 Field Bldg., Chicago 3

WATCO QUICK CHANGE BOX

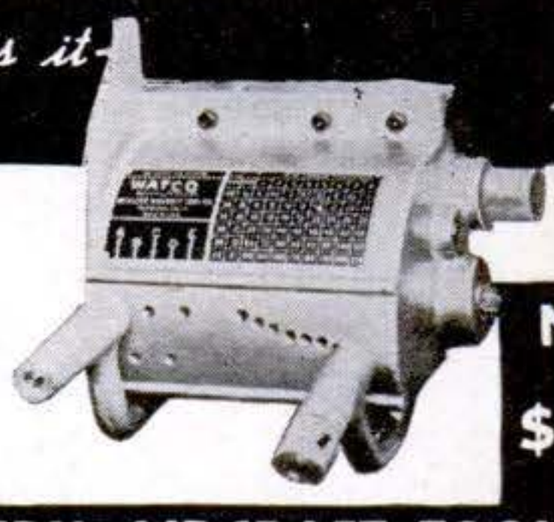
Converts standard lathe to quick change lathe. This is it—
A **REAL HELP** *to hobbyist or small shops*



WATCO gives greater versatility to small lathes, increases accuracy. Cuts accurate threads from 4 to 224 per inch. Gears made of high grade alloy steel and precision hobbed. Replaceable bronze bearings. Requires no special skill to operate. Easily installed.

For use on Atlas—Craftsman—Powercraft—South Bend 9" Model B & C only — Logan.

BUY FROM YOUR DEALER or Write Dept PS-6



F. O. B. Burbank

NOW ONLY $75

WESTERN AIRCRAFT TOOL CO.

2505 NO. ONTARIO ST., BURBANK, CALIF.

Copyrighted material

WORLD'S LOWEST PRICED ADDING MACHINE

VEST POCKET SIZE

IDEAL FOR BUSINESS OR PERSONAL USE

FREE TRIAL
ONLY $2.50
TOTAL COST
SEND NO MONEY

Each Baby Calculator in Beautiful, rich-looking Leatherette case—at no extra cost. **FREE!!**

Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. Substantially made of 28-gauge steel—guaranteed for life against defects in construction. You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 30 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to ten million. Pays for itself over and over in mistakes avoided, and time saved. **MAKES IDEAL GIFT.**

Sold on a positive money back guarantee. Send only $2.50, Calculator sent postpaid, or send name and address and pay postman $2.50 plus postage. **MONEY BACK IN 10 DAYS IF NOT DELIGHTED!** (If outside U. S., send $3.00.) **AGENTS WANTED.**

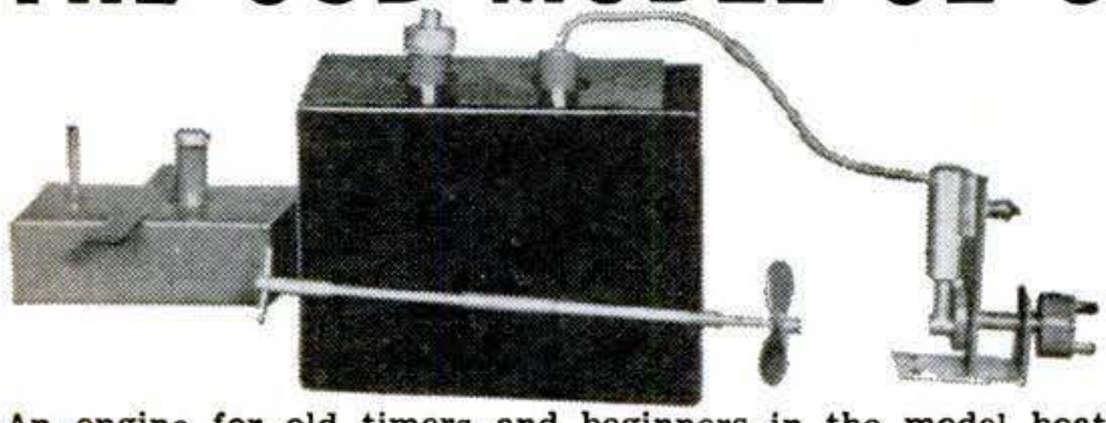
CALCULATOR MACHINE CO., (Mfrs.)
Dept. 479 P.O. Box 248, Glenview, Illinois

Assemble KING MIDGET

Practical highway racer runabout. New model. We supply all parts. Just bolt together. Low cost. Ready for delivery NOW. One or two cylinder, 40 m.p.h., up to 100 miles per gallon. Send 25c for complete new literature with large picture, 4-view drawings, price of parts, or send $1 (refunded with first order) for the above, plus 24 page booklet showing complete assembly with 30 photographs and drawings.

MIDGET MOTORS **Athens, Ohio**

THE CUB MODEL SE-8



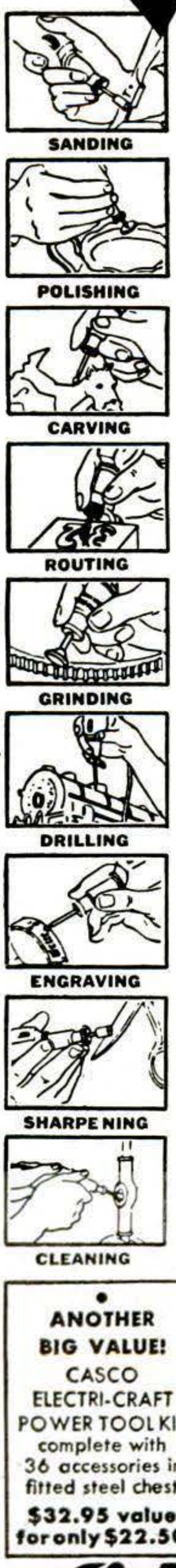
An engine for old timers and beginners in the model boat game. Here is an engine for that small model of yours. The CUB was designed for hulls 16" long and larger. It can also be used as a stationary engine. The CUB is a single-cylinder oscillating type engine of 7/16" bore by 5/8" stroke. Burns alcohol. Runs 8 minutes. Drives a 1½" propeller.
Price postpaid, complete ready to run, with boiler, burner, propeller, shaft and fittings, and 70-lb. safety valve **$4.80**

PHILIP STEVENSON COMPANY
Box 162, Station D **Cincinnati 6, Ohio**

LOW PRICED

FOR THE FIRST TIME IN YEARS!

DOES ALL THESE JOBS EASIER, BETTER



FAMOUS CASCO POWER WORKSHOP

New portable all-purpose Electr-O-Tool Kit

FOR MECHANICS, HOBBYISTS, HOME CRAFTSMEN

Speed your work on wood, metal, glass, plastics, leather with this professional all-purpose tool. More exclusive features than any other tool on the market. Long life, powerful 20,000 RPM motor in unbreakable plastic case, oil-less bearings, air-cooled. Exclusive built-in finger grip for perfect control in fine detail work. Weighs only 12½ oz. Fully guaranteed. Complete with 20 precision-made accessories in fitted chest. Hobby or professional work is easier with this whole shop full of tools in one. Do hundreds of jobs by simply changing the versatile accessories.

Buy at your dealer's today. If he cannot supply, write direct to factory giving dealer's name. *Free* descriptive literature on request.

SPECIAL LOW PRICE OFFER

Price of power tool alone	$14.95
20 accessories and valuable Project Book	8.50
Total Value	$23.45

ALL 21 PIECES FOR ONLY $14.95

ANOTHER BIG VALUE!
CASCO ELECTRI-CRAFT POWER TOOL KIT complete with 36 accessories in fitted steel chest
$32.95 value for only $22.50

CASCO

CASCO PRODUCTS CORPORATION • BRIDGEPORT 2, CONN.

Copyrighted material

TO: Reader
FROM: Editor

In PSM's WORD SHOP

WHERE is Lac Seul? In what year was the cathode-ray tube discovered? Do you spell the U-boat breather tube Shnorkel, Snorkel, or Schnorkel? Paraphrase "registry of noncyclic motion" so that the nontechnical reader can understand it.

No, this isn't the script for Information Please. It is just part of the daily budget of questions that PSM's copy room must answer promptly—and accurately.

You probably never heard of a copy room. Most people haven't. Its inhabitants, who are called copyreaders, are used to being confused with (a) proofreaders, who wear long green eyeshades and live in printing shops, and (b) copywriters, who wear hand-painted neckties and frequent advertising agencies. Copyreaders are a different breed. Their job is to take a long look at everything that goes into PSM and see that it is complete, correct, comprehensible—and at the printer's on time.

Take the problem of fitting to space. PSM, as you know, is one of the few magazines that don't make you grope for carryovers. But this means that every piece has to fit to the last word. To trim an article so as to save style, sense and space is an art. The copyreader finds himself looking for a four-letter synonym for phenomenologist to squeeze in that last line.

JOHN F. STEARNS comes from a whole family of writers and editors, and for the last 14 years he's been wavering between the two professions. As head of PSM's copy desk he makes full use of experience gleaned on newspapers, on magazines, and as a freelance. The AAF tried for a year to make him a radio operator, then made him copy chief of the Office of Flying Safety. His two chief hobbies: studying the machinery of aviation, and tinkering with radio sets.

Then there are deadlines—the copyreader's sword of Damocles, ready to drop on his head at any moment. PSM has three major deadlines a month—and then the copy room is even more harassed than usual. Author Doakes wants two more days to polish his article. A layout isn't ready at the last minute for lack of a special cutaway. A professor, checking a piece, changes one little sentence—which means resetting two pages—and the printer is already screaming . . . See what I mean?

CAROL ENNIS, young as she is, is the veteran of the copy room, having mastered the idiosyncrasies of four chiefs. She carries in her head the Chinese puzzle of PSM's production schedule—involving engravers, two printers, first form, second form, roto section, first and second proofs, foundries and red prints. She takes evening courses in editing at Columbia, ran a club newspaper for servicemen during the war.

Editors can dream of speaking to millions of readers; writers are wrapt in their beautiful prose, but the copyreaders are face to face with reality: Is there or is there not going to be a magazine on the stands next month?

SHELDON M. GALLAGER is the latest recruit to PSM's copy room, coming straight from Antioch College. Through the Antioch system of alternate work and study, however, he has already had considerable experience. His major interest is the philosophical implications of science; his major worry at the moment is struggling with the popular items "I'd Like to See Them Make" and "New Ideas from the Inventors."

Like the President's assistants, copyreaders are supposed to be people with a passion for anonymity. But, even if you don't know they're there, you'd miss them if they weren't. Which is why you'll find three of them on this page today.

Hartley E. Howe

Copyrighted material

My dentist looked down in the mouth!

I see my dentist twice a year, regular. But does he see me—his Doctor of Motors—regular? He does *not!*

"Look," I told him a few days ago, "cars, like teeth, need good care. You expect good service from your car every day, yet you never think to take care of it."

Boy, he certainly looked down in the mouth. But after I had ground the valves and put in new gaskets and a set of Perfect Circle Piston Rings, she stopped pumping oil, gave him more power and drove like a dream. He was one happy Doc as he drove away.

A Doctor of Motors, like a dentist, can spot trouble before it happens and keep little troubles from becoming big ones. Just that regular care can save plenty in worry and money.

NOTICE TO CAR OWNERS

Perfect Circles are available at any automotive repair shop. Your favorite mechanic — your Doctor of Motors — recommends them.

PERFECT CIRCLE PISTON RINGS

Your Doctor of Motors restores power . . . saves gas . . . saves oil with . . .

PERFECT CIRCLE PISTON RINGS

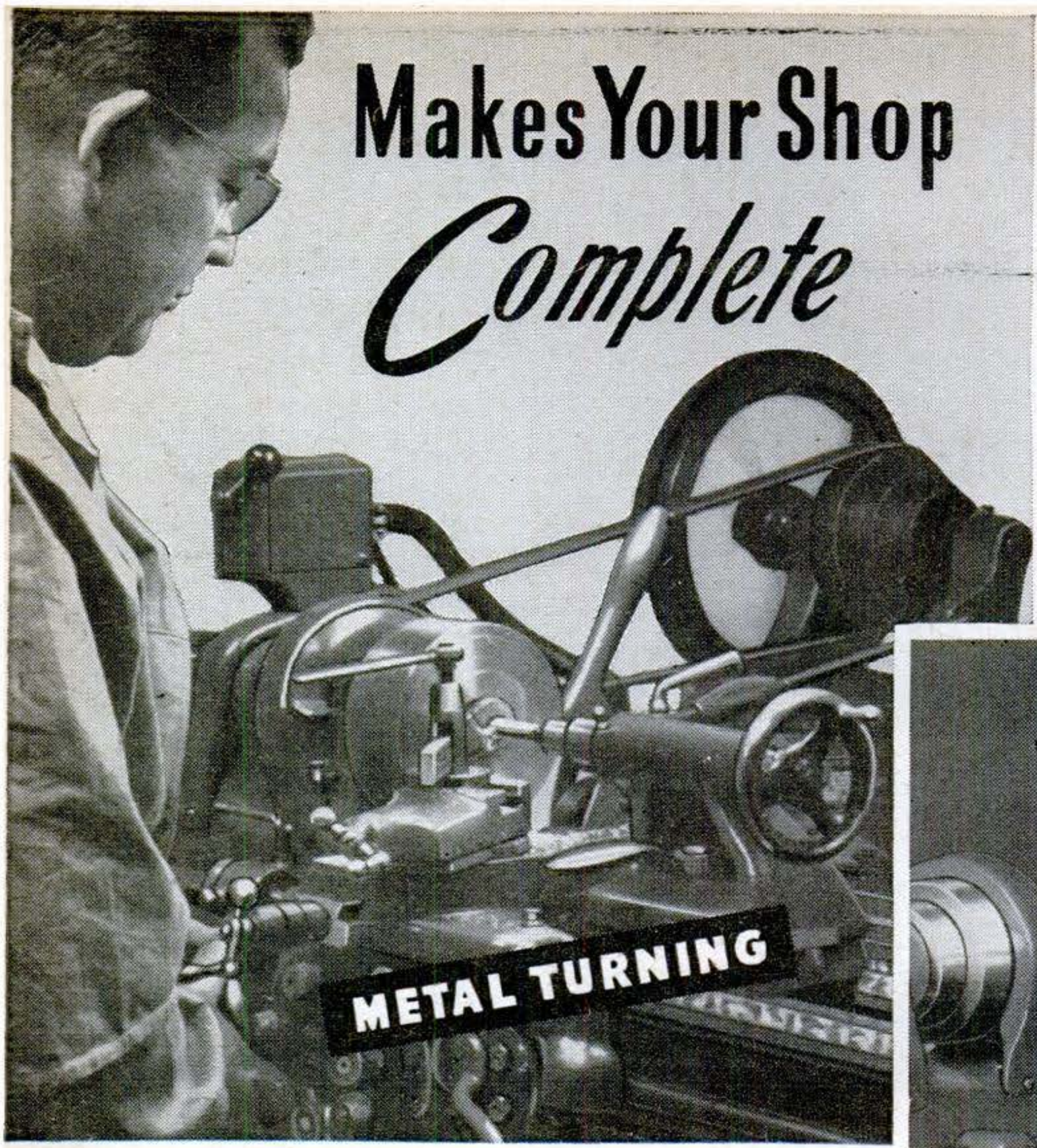
PERFECT CIRCLE CORPORATION, HAGERSTOWN, IND., U. S. A. and TORONTO, ONT., CAN.

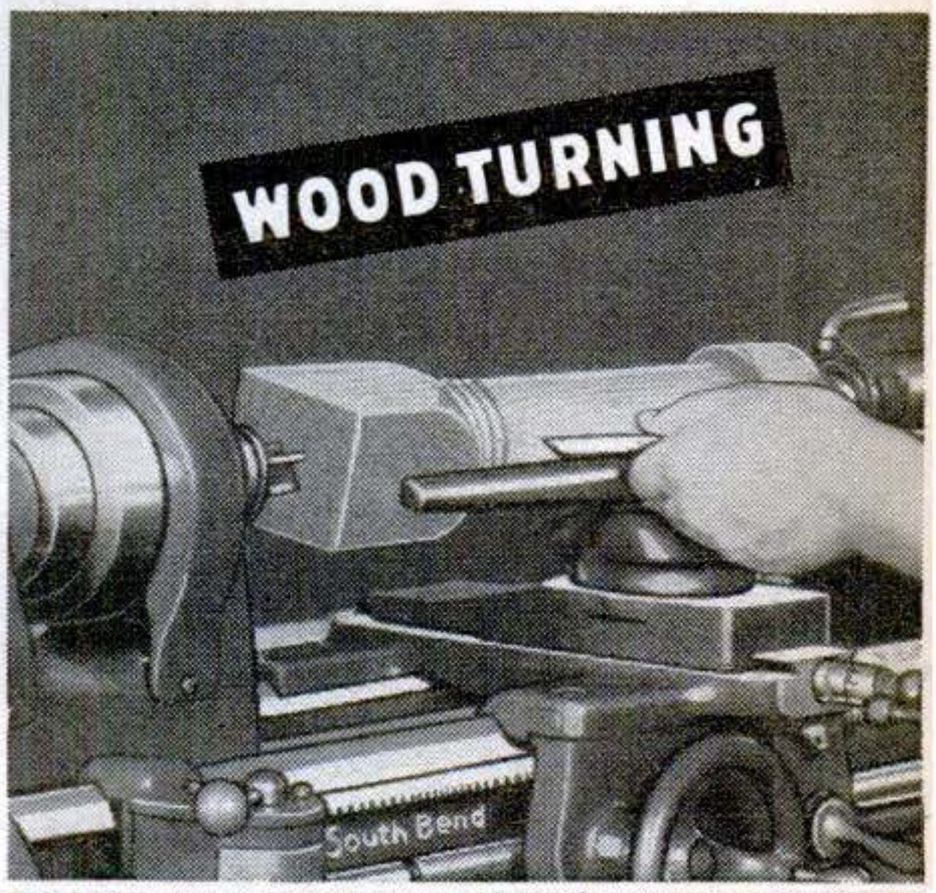
Copyrighted material

Makes Your Shop *Complete*

SOUTH BEND

The Multi-Purpose Lathe





You get more enjoyment and use out of your shop when you have a South Bend Lathe. It opens up new fields for you—new hobbies, new projects and a diversification of work that is both interesting and profitable.

This better metal working lathe reduces to a minimum your investment in basic shop equipment—its ruggedness and built-in accuracy will help you to turn out better work. And available attachments and accessories make possible the performance of many operations ordinarily done on other machines. Mail coupon for catalog.

South Bend Lathe Works
456 E. Madison Street, South Bend 22, Indiana

Please send latest South Bend Lathe catalog.
Size lathe in which I am interested is_____

Name_____

Street_____

City_____ State_____

SOUTH BEND LATHE WORKS

BUILDING BETTER LATHES SINCE 1906

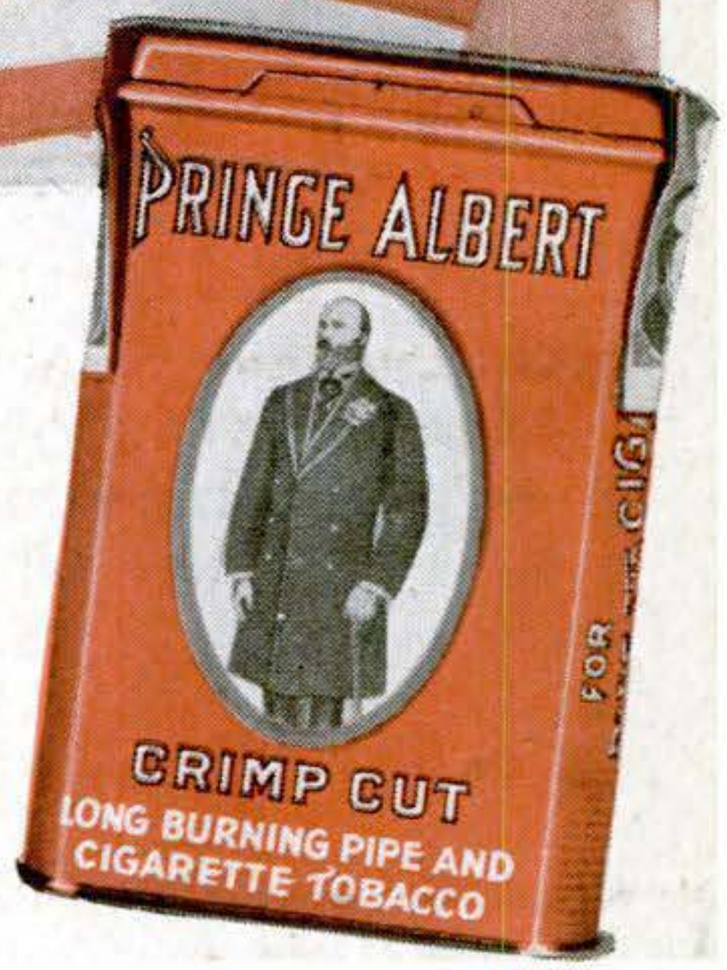
Copyrighted material

It's smoother sailing when you've got P.A.*

P.A.* means Pipe Appeal

When a man smokes a pipe, he has a masculine attractiveness that women find appealing! And, when he smokes Prince Albert, he has a rich-tasting smoke that's easy on the tongue!

means Prince Albert

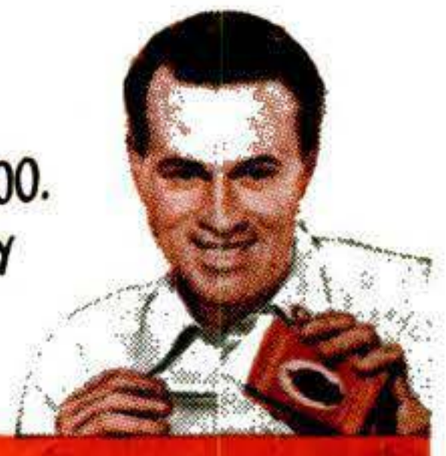


Try Prince Albert and you'll agree—it's a great tobacco! P.A. is *crimp cut*—packs and cakes just right in your pipe . . . smokes cool and even right down to the bottom of the bowl.

R. J. Reynolds Tobacco Co., Winston-Salem, N. C.

The National Joy Smoke

A GREAT CIGARETTE TOBACCO TOO. NOTHING LIKE P.A. FOR FAST, EASY ROLLING AND TASTY SMOKING!



Copyrighted material

EXPERIENCE IS THE BEST TEACHER!

Simple dives... intricate spins — Mildred O'Donnell mastered them all to win New York's Metropolitan diving championship.

IT'S TRUE IN DIVING...
EXPERIENCE IS THE BEST TEACHER!
...AND IN SMOKING TOO.
THE CIGARETTE FOR ME IS **CAMEL!**

Mildred O'Donnell
DIVING CHAMPION

More people are smoking CAMELS than ever before in history!

Yes, experience during the shortage taught millions the differences in cigarette quality!

DIVING Champion Mildred O'Donnell hasn't forgotten the war shortage of cigarettes.

"I never realized there were such differences in cigarettes until the shortage," she recalls. "That's when I really learned what cigarette suits me best — Camel."

Millions of others had the same experience, with the result that *today more Camels are being smoked than ever before in history.*

IT WAS NO FUN, the cigarette shortage; but it was a real experience.

R. J. Reynolds Tob. Co., Winston-Salem, N. C.

According to a recent Nationwide survey:

MORE DOCTORS SMOKE CAMELS

than any other cigarette

Three nationally known independent research organizations asked 113,597 doctors to name the cigarette they smoked. *More doctors named Camel than any other brand.*

Copyrighted material